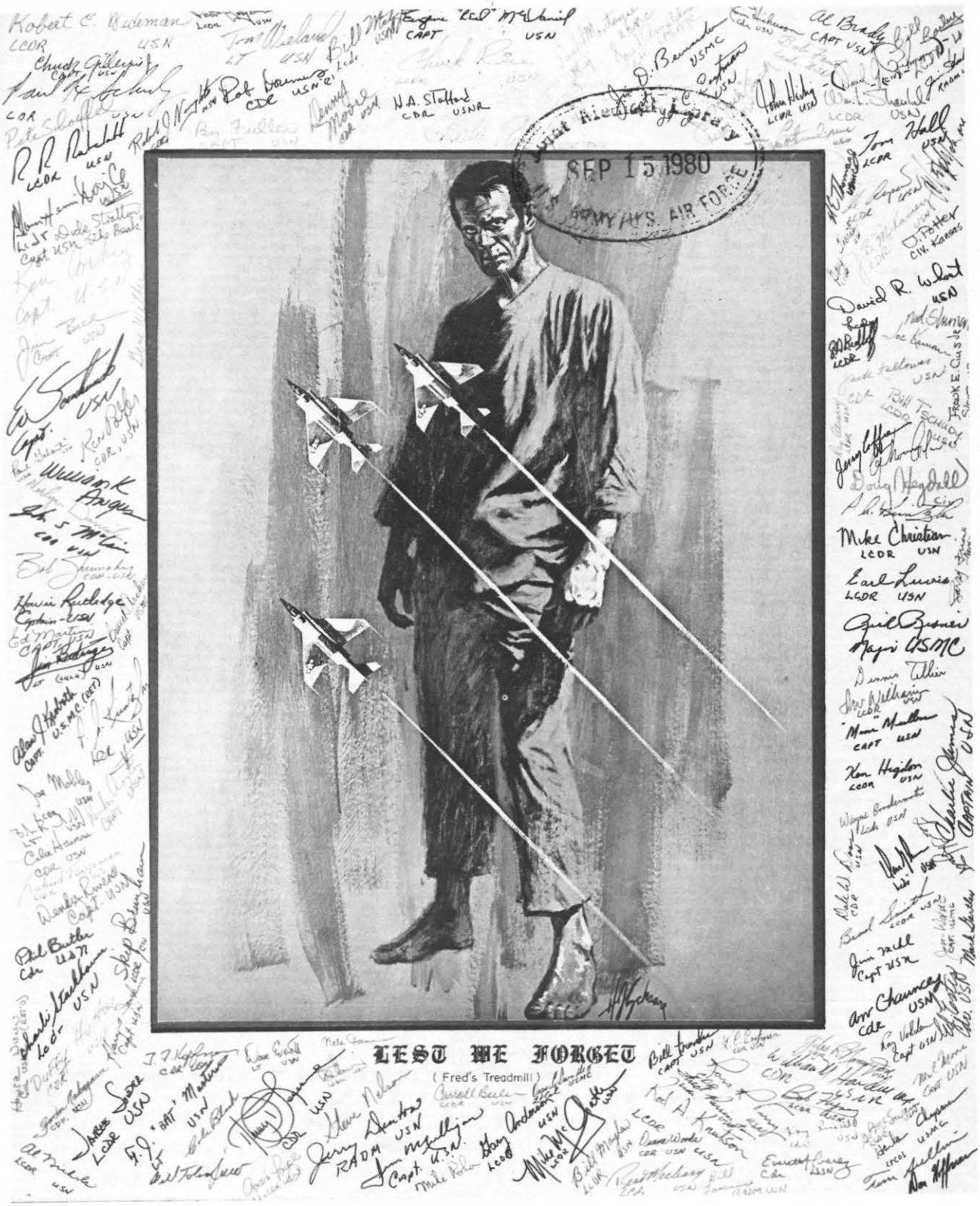
U. S. NAVY MEDICINE

August 1980



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U.S. NAVY MEDICINE

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COVER: Seven years have passed since our POWs were released by North Vietnam, some after spending as many as eight and a half years in captivity. After an initial DOD-sponsored, five-year program of medical and psychological evaluation and treatment, the Navy chose to extend the program for its personnel an additional five years. This month's cover story (page 18) reports on that program's preliminary findings.

The poster on the cover was taken from an original painting belonging to the U.S. Air Force and hangs in the Naval Aerospace Medical Research Laboratory's ECG treadmill room. There, the returned Navy and Marine Corps POWs were stress-tested by Fred Weaver, NAMRL's stress ECG technologist. The aviators' autographs decorate the poster's border.

A Farewell Message

On 31 July 1980, VADM Arentzen delivered an address at a retirement ceremony honoring his service as Surgeon General of the Navy. U.S. NAVY MEDICINE here reprints excerpts from that address.

It seems only yesterday that I took the oath as Surgeon General. Much has happened since that time. It is very tempting to take a retrospective look at the past and to reflect on what has been and what might have been. I am going to resist that temptation and instead ask you to look only forward.

The future of Navy medicine looks bright indeed for those of you willing to seek out the challenges. The challenges may be in the form of problems and the opportunities will depend on your willingness to deal with them. If you embrace the problems eagerly and are positive in your pursuits, you will prevail. The future of health care is difficult to foresee since it is a matter of economic, political, and medical decisions still to be made. Many of the changes that will confront Navy medicine in the decade ahead are already on the march. As predicted at the beginning of the past decade, the cost of health care has now reached $200 billion annually. If health care costs continue to increase at the rate they have in the past two decades, my grandchildren and yours will be spending all their personal income for health care. The absurdity of that statement is enough to prove that changes are going to come. The question is what kind of change and which way will it go?

Many different scenarios have been offered but one thing is quite certain. The economics of health care delivery will be the driving force. The rising cost of health care and the increasing impersonalization of medical service is going to cause health care professionals to pause and think about their plight. The only logical conclusion that can be made is that we can hardly expect to continue to absorb increasing shares of personal income indefinitely and that the diminishing returns on creative technology require very selective decision-making about the future choices. Increasing technology is making medical care riskier than ever. And rising malpractice suits are making physicians wary of being placed on the risky pedestal of omniscience. As health professionals become wary of rising risks, costs, and debts, more emphasis will have to be given to placing responsibility where it belongs, upon the individual for health maintenance rather than on a system of "technofix" cures. We in the Navy Medical Department are already moving in that direction.

The day has passed when health care professionals and institutions can humbly absorb themselves in their own work and escape questions of social dimensions and economic realities. You are going to have to make some hard judgments about where you are and where you want to go. As providers of health care, you must understand something of why our line leaders, our legislators, and taxpayers are demanding to know how their dollars are spent on health care. They are outraged at the scarcity of primary care and of some kinds of specialized care in the midst of the vast public outpouring of funds for medicine. This is a main topic in budget hearings before the Congress and in meetings with the line leaders. On the other hand, you must have the where-with-all to do the job. The idea of a health care delivery system that is instantly available, personalized, one-class and first-class, free or low-cost to the individual, and economically feasible for the government, is beyond the realm of contemporary reality.

The challenge, especially for future health professionals, will be to help create a system that will give the Navy the best of both worlds—the world of advanced science, technology, specialized personnel, and systems engineering, and also the world of individual freedom, individual responsibility, personalized, and holistic health care all reasonably available and at a cost government can afford.

I firmly believe that the military medical system will be in the forefront of the exciting times ahead. America is waking up from its Rip Van Winkle sleep; your greatest days are ahead, not behind you. The people and the Congress are again realizing the importance of a strong national defense and this will be reflected in increased expenditures for defense and its people. As the nation wakes up, regains its vigor, and begins to prepare for the future, I think you are going to find that the quality of life in the military environment will be better than ever before. We have been fortunate to have leaders like Secretary Hidalgo and Admiral Hayward, who have the courage to speak up and tell it as it is.

The Navy Medical Department must continue to consolidate its strength, and achieve new goals of health care for the benefit of our beneficiaries. You cannot be content with the status quo or reliving past experiences. You must consistently look to the future, develop new leadership, adopt policies to changing conditions and new technologies—but always, always with unswerving loyalty to the mission of the Navy Medical Department as the instrument for improving and enhancing the quality of life for those who serve our country.

Isaac Newton once said that if he had contributed anything it was because he was standing on the shoulders of others. I can only say that your shoulders have been broad and strong. You have made it easy, and I thank you for the highest honor that could be paid any physician —the honor of leading this great Medical Department which serves the people who serve their country. It has been both a humbling and tremendously rewarding experience. It has given me the opportunity of knowing and working with every discipline of health provider—physicians, dentists, nurses, physicians' assistants, administrators, corpsmen, civilians, and the many other support personnel. Each has made a significant contribution to the Navy Medical Department. Their council has been wise; their support outstanding; their friendship rich and warm. It is their camaraderie that I will miss most of all.

To our civilian and line leaders, who are acutely aware of the importance of health care as a quality of life benefit, and who have supported us to the best of their ability goes my sincere appreciation for their support and for the opportunity to serve.

I leave confident that the stewardship of Navy medicine passes to capable hands. Admiral Cox possesses the leadership, the compassion, the stamina, and most importantly, the dedication to guide the Navy Medical Department to new heights and progress in service to our people. I leave him and all of you with a thought which I believe will sustain you as it has me. Always practice your profession in the tradition and the spirit of Doctor Schweitzer, whose jungle hospital bore a sign which read, "Welcome, at whatever time you come, you will find light, you will find help, and you will find human kindness."

To all of you, I offer my heartfelt thanks for your support and I bid you farewell.

Computer-Assisted Diagnosis of Acute Abdominal Pain

BUMED Film Teaches Submariners How It's Done

LCDR Joseph V. Henderson, MC, USNR
Carl Black

The health care of submarine crews on patrol poses a special problem for the Navy. While on patrol, crewmembers are away from primary sources of medical support for extended periods of time. During times when a submarine must operate under radio silence, even the relayed advice of a doctor cannot be sought until after an illness has been determined to be critical. For these reasons, submarine crews are perhaps the best medically screened personnel in the Navy.

But in spite of this screening, it is inevitable that a few of these people will develop serious medical problems. And when a medical crisis occurs, it will be the job of the submarine's corpsman, the sole medical expert aboard, to diagnose the illness, treat it, or—and this is very important—recommend to the captain that the patient be evacuated to a primary medical care facility. *

The question of whether to evacuate an ill crewmember is, indeed, a serious one. Because an evacuation exposes the submarine's position, the submarine's mission may be compromised, thus, directly affecting national defense. Evacuation can also be dangerous to the patient and the rescuers. Further, an individual evacuation can be expensive, costing many thousands of dollars.

Although many medical evacuations are necessary and appropriate, some are unnecessary. In the latter case, errors are made in diagnosis or in the assessment of the appropriateness of treating the illness aboard the submarine. (*1*)

The Navy has taken two separate approaches to the problem of unnecessary medevacs. The Naval Medical Research and Development Command (NMRDC), through work at the Naval Submarine Medical Research Laboratory (NSMRL), has been studying the use of computer technology to aid submarine corpsmen in patient management decisions: diagnosis, prognosis, and treatment. (*2*) The system it has developed utilizes a microcomputer already aboard nuclear submarines and deals primarily with acute abdominal pain, the most frequently encountered evacuable condition. (*1*) At the Naval School of Health Sciences Education and Training Command (HSETC), a training program is under development to refresh and update the training of corpsmen reporting to or already assigned to submarines. This program combines individual study and clinical experience. Instructional materials are now being developed and a prototype clinical training program has been instituted at the Naval School of Health Sciences, Portsmouth, VA. (*3*)

At NSMRL, it was found that using a computer requires a structured, organized approach to physical diagnosis, and that each item of data be defined well and explicitly. Also, studies indicated that in order for the computer programs to work, it is *vital* that independent duty or submarine corpsmen be trained according to these definitions and procedures for gathering data. (*2*) A great need existed for instructional tools to teach these skills.

HSETC had a similar need. It was recognized that any submarine corpsman refresher course had to deal with diagnosis and management of abdominal pain. An organized, well-defined approach to abdominal pain diagnosis required by a computer could meet the requirements for a criterion-referenced physical diagnosis course. It could provide the basis for a no-frills approach, where specific abdominal pain diagnosis skills are taught and where a limited objective such as the stabilization of a patient is sought.

LCDR Henderson is Head, Submarine Medicine Division, Environmental Medicine Branch, Naval Submarine Medical Research Laboratory, Groton, CT 06340.

Mr. Black is a film writer-director-producer at the Educational Media Division, HSETC, Bethesda, MD 20014.

*From the introduction to *Computer-Assisted Diagnosis of Acute Abdominal Pain.*

Photo by Robert Beltz

Actor Bob Armstrong waits on sick bay set as Director Carl Black (seated) gives instructions.

A partnership of mutual benefit was developed between NMRDC and HSETC that addressed the medevac question. The collaboration has resulted in the production of a film that can be used either to train corpsmen for computer-aided diagnosis or serve as the basis of a videotape that can aid in refresher training of submarine (and other independent duty) corpsmen.

Computer-Assisted Diagnosis of Acute Abdominal Pain (MM-0000) takes place in the sick bay of a Polaris submarine. For convenience and to minimize cost, a set that elaborately duplicates the sick bay of a nuclear submarine was constructed at the Naval Photographic Center (NPC) in Washington, DC. The film was shot using NPC staff

Photo by Robert Beltz

The set duplicates in detail the sick bay of a Polaris submarine. In addition, NPC furnished its full in-house support: production facilities, stage and film crews, animation, and film-processing support.

and on the NPC sound stage where, in the 1940s, such actors as Gene Kelly and Jackie Cooper participated in the production of BUMED training films (see *U.S. Navy Medicine,* April 1979). In lending this assistance, NPC served as a coproducer of the film.

The film begins with scenes showing an evacuation from a U.S. Navy nuclear submarine that actually occurred in the North Atlantic during a winter patrol. This footage, provided by the British Broadcasting Company, emphasizes the inherent dangers of such an operation by showing a patient, strapped into a Stokes stretcher, washed overboard while being prepared for helicopter evacuation. Fortunately, the patient is recovered by the British helicopter rescue team.

Actors playing the part of patient and corpsman then demonstrate methods of obtaining specific history and physical examination information. The film takes the student through the history and physical examination item by item following a prescribed data sheet. For each item the actors, patient and corpsman, interact as the narrator emphasizes do's and don'ts. For example, in the category "Color," the importance of color as a diagnostic indicator is stressed as it relates to flushing, pallor, cyanosis, and jaundice.

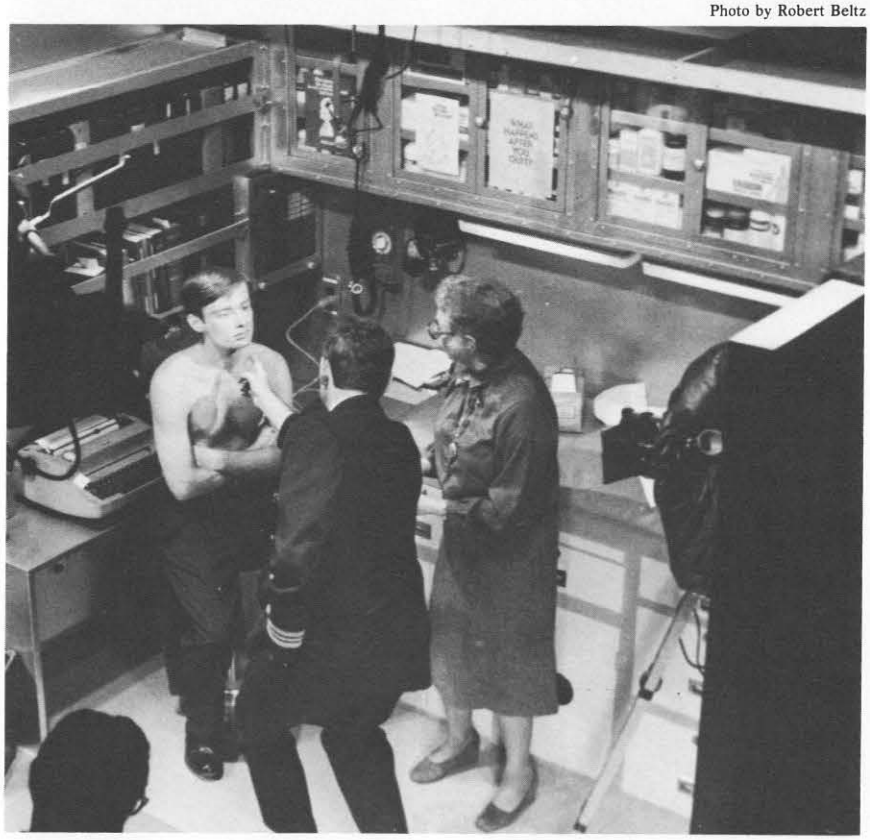
Photo by PH1 Douglas Klotzbach

Dr. Joe Henderson demonstrates Murphy's sign to professional actors Frank Stoegerer and Bob Armstrong on the NPC set.

Dr. F.T. deDombal of the University of Leeds, England, provided the original abdominal pain computer program to the Navy and acted as technical consultant for the film. (*4*) In addition to establishing many of the criteria for data-gathering depicted in the film, his review of the script was of great value.

The film represents collaboration at many levels—within BUMED, within the Navy, and within the international medical community. This joint effort will serve to improve health care and preserve the operating strength of our submarine force.

Photo by Robert Beltz



The difficult portrayal of pathologic changes in skin color required the talents of Lillian Brown, a makeup specialist who provided makeup for several Presidents, including President Carter.

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3. Dutton BD: Refresher Training for Submarine Corpsmen: A Working Model. *U.S. Navy Medicine* 70(12):18-20, December 1979.

4. deDombal FT: Surgical Diagnosis Assisted by a Computer. *Proc Royal Soc Lond B* 184, 433-470. □

*Ed. note: 16 mm prints of the film will be available in the near future. In the meantime, activities can request ¾-inch videocassettes by writing the Audiovisual Resources Branch, HSETC, Bethesda, MD 20014.

Patient Classification: The First Step Toward a Nurse Staffing System

CAPT Mary Kelly, NC, USN
LCDR John E. Montgomery, MSC, USN

At the time this patient classification system study was initiated by the Research Department, Naval School of Health Sciences, Bethesda, MD, several naval hospitals were working with patient classification. However, no one system was considered completely satisfactory, nor had any of the classification systems considered for use in naval hospitals been tested for consistency or reliability. It was, therefore, considered necessary to develop a patient classification system to meet the specific needs of the study.

Patient Categories and Condition Indicators

The system divides patients into four categories (Figure 1), each reflecting the patient's level of dependency on nursing personnel. This division is accomplished through the use of weighted condition indicators identified for each patient. The condition indicators are observable aspects of a particular patient's condition, generally relating to nursing care procedures and activities of daily living. They reflect the patient's level of dependence in the areas of bathing, eating, and mobility and give specific information relating to treatments, emotional and teaching needs, mental capacity, etc. The condition indicators used with this classification system are listed with their weights in Table 1.

Quantitative Guidelines

To describe the condition of a particular patient, some or all of the 34 indicators may be appropriate. The applicability of all appropriate indicators should be sufficient to place a particular patient in one of the four dependency categories. The condition indicators are weighted because some of them may have more or less individual impact on a patient's level of de-

Patient Classification Categories

I. **Minimum Care.** Patients require little or no assistance with activities of daily living. They require a minimal amount of nursing care relative to medications, treatments, and teaching needs.

II. **Intermediate Care.** Patients generally require assistance with or supervision of most activities of daily living. They require more than minimal care relative to their medications, treatments, teaching, and emotional needs. They do not, however, require frequent skilled care and observation throughout the shift. Their nursing care needs, although significant, are generally intermittent in nature.

III. **Complete Care.** Patients require frequent, skilled nursing care throughout the shift. They require the assistance of nursing personnel to initiate, supervise, or mediate the performance of most activities of daily living and may require frequent and complex medications and treatments. They may also require significant amounts of teaching and emotional support.

IV. **Intensive Care.** Patients require continuous skilled nursing care throughout the shift for the prevention of complications and may be in and out of control. Frequent reevaluation is necessary so that immediate adjustment of therapy can be undertaken.

FIGURE 1

CAPT Kelly is Nursing Research Associate at the Naval School of Health Sciences, Bethesda, MD 20014.

LCDR Montgomery is Assistant Director of Research at the same activity.

TABLE 1. Patient Classification Condition Indicators

Indicators	Subgroup Codes	Subgroup Descriptors	Weights
Isolation	1	Enteric	2
	2	Respiratory or wound	4
	3	Protective or strict	8
Mobility	4	Ambulatory with crutches, etc.	3
	5	Assist in bed	5
	6	Total	10
Bath	7	Self	-2
	8	Assist	2
	9	Total	7
Feeding	10	Self	-1
	11	Assist	3
	12	Total	8
Incontinent or Diaphoretic	13		7
Sensory Deficits	14		7
Vital Signs	15	Every 2 hours	7
	16	Every hour	9
	17	More than every hour	11
Confused or Disoriented	18		9
Intravenous	19	Single	3
	20	Multiple	5
	21	Blood or Hyperalimentation	8
Special Medications	22		5
Treatments	23	15 minutes or less	3
	24	Greater than 15 minutes	5
Surgery or Special Procedures	25	One	5
	26	More than one	6
Tubes	27	One	3
	28	More than one	5
Respiratory Therapy	29		4
Emotional Needs	30	15 minutes or less	4
	31	More than 15 minutes	7
Teaching Needs	32	15 minutes or less	3
	33	More than 15 minutes	6
Accompany off unit	34		5

WARD _____ DATE _____ CLASSIFIER _____

PATIENT CLASSIFICATION WORK SHEET

CONDITION INDICATORS	SUBGROUP CODING I	II	III
A. ISOLATION	1	2	3
B. MOBILITY	4	5	6
C. BATHING	7	8	9
D. FEEDING	10	11	12
E. INCONTINENT	13		
F. SENSORY DEFICITS	14		
G. VITAL SIGNS	15	16	17
H. CONFUSED/DISORIENTED	18		
I. IV THERAPY	19	20	21

CONDITION INDICATORS	SUBGROUP CODING I	II	III
J. SPECIAL MEDICATIONS	22		
K. TREATMENTS	23	24	
L. SURGERY/SPEC. PROCEED.	25	26	
M. TUBES	27	28	
N. RESPIRATORY THERAPY	29		
O. EMOTIONAL NEEDS	30	31	
P. TEACHING NEEDS	32	33	
Q. ACCOMPANY OFF UNIT	34		

PATIENT	APPLICABLE SUBGROUP CODES	POINT TOTAL	CLASS	ACTIVITY GROUPS PT CARE	MEDS	TEAM LDNG	ADM	ASSESS
1.								
2.								
3.								
4.								
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30.								

SUMMARY CLASS I [ ] CLASS II [ ] CLASS III [ ] CLASS IV [ ]

FIGURE 2

PATIENT CLASSIFICATION WORK SHEET

DATE _____
CENSUS _____

CONDITION INDICATORS	PATIENT														
A. ISOLATION															
B. MOBILITY LIMITATIONS															
C. BATH															
D. FEEDINGS															
E. INCONTINENT DIAPHORETIC															
F. SENSORY DEFICITS															
G. VITAL SIGNS															
H. CONFUSED DISORIENTED															
I. INTRAVENOUS															
J. SPECIAL MEDICATIONS															
K. TREATMENTS															
L. SURGICAL-SPECIAL PROCEDURES															
M. TUBES															
N. RESPIRATORY THERAPY															
O. EMOTIONAL NEEDS															
P. TEACHING NEEDS															
Q. ACCOMPANY OFF THE UNIT															
R. ADMISSION/DISCHARGE															
TOTAL POINTS															
CATEGORY															
SIGNATURE OF NURSE															

FIGURE 3

pendency. Psychological scaling techniques were used to weigh each condition indicator in conformance with the judgment of a panel of nurses. (*1*)

Guidelines for determining patient classification based on sums of indicator weights were developed in the following manner. Two nurses working independently, assigned condition indicators to 76 hypothetical nursing care plans. The nurses settled differences in the assigned indicators by consultation until they agreed on the appropriate indicators for each patient. The same nursing care plans were then given to two panels of nurses who classified them according to the broad category definitions of Figure 1. The numerical weights assigned to the condition indicators of each patient were added and the resulting totals were compared with the patient class assigned to each patient by the nursing panel. Numerical ranges for the sums were then established, providing the greatest agreement between the weighted total of condition indicators and the dependency class of the patient determined by the nursing panel. The resulting intervals were: Class I, -3 through 7 points; Class II, 8 through 29 points; Class III, 30 through 59 points; and Class IV, 60 or more points.

Recording Form

The patient classification work sheet (Figure 2) used in this study contained information relating to patient care assignments as well as patient classification. It is therefore more complicated than a form needed only for patient classification information and has spaces for recording identifying information such as ward, date, name of classifier, and names of patients as well as spaces for condition indicator codes, weight totals, category numbers, and total numbers of patients in each category. It also includes the condition indicators and their identifying codes for easy reference. These indicators are arranged as nearly as possible in the order they are found on the nursing care plan. Instructions for completing the work sheet emphasize that the individual assigning condition indicators should refer to the detailed indicator definitions given in an instructional packet and should not rely on the limited condition indicator labels on the work sheet.

Adaptation of the System to Other Hospitals

In developing and implementing the patient classification system for this study, many difficulties were encountered and overcome. Based on this experience, a second naval hospital that implemented the system was able to avoid some of the same difficulties. The following suggestions may prove helpful for those who want to adapt the system described here for at other hospitals.

- Choose one area or service in which to start patient classification, such as Medical/Surgical, OB/GYN, Pediatrics, ICU, etc.
- Choose condition indicators that meet your needs. Do not waste time trying to develop different indicators if the ones used with this system appear to meet your needs.
- Define your condition indicators carefully. Give examples and qualifying information where needed. For example, if the condition indicator "patient teaching" is to be used only if the teaching need is specifically addressed on the nursing care plan, include this qualification in the definition of patient teaching.
- Seek appropriate professional assistance in weighting condition indicators and setting patient classification boundaries. (*1*)
- Train a few people who will be using the system and test slowly. Be prepared to make revisions where needed.
- Do not get discouraged.

Implementing the System at Other Hospitals

Several decisions must be made before implementing patient classification on the wards.

- Decide what use will be made of the patient classification information after it is gathered.
- Determine who will assign condition indicators to patients. It is of utmost importance that the individual assigning indicators be totally familiar with the classification system and with the patients.
- Decide when patients will be classified. If the system is used for assigning staff for the P.M. shift, classification should be done late enough in the A.M. shift to reflect the projected condition of the patient on the P.M. shift, yet early enough to make any needed staffing changes.
- Decide what patient classification form to use with the system. One possibility is the form displayed in Figure 2. A second possibility is a form that allows condition indicators to be checked for each patient (Figure 3). Both forms are designed for use with a centralized classification system. The condition indicator codes or check marks are converted to appropriate weights and added for each patient at a central location. The person filling out the classification information on these forms need not be concerned with adding the weights. Also, since the condition indicator weights are not readily available to the person filling out the form, possible biases toward heavily weighted indicators are minimized. A third possibility is a form that directly displays the condition indicator weights. With such a form, the person filling in the form can also complete the patient classification by adding the indicator weights as the indicators are assigned.

Testing of the patient classification system described here has shown it to be approximately 90 percent consistent with professional nursing judgment relative to appropriate classification of patients. Nurses, appropriately trained in the use of the system, can apply it with a high degree of reliability. The system thus provides a valid way of collecting data on the dependency mix of patients to be cared for.

Although patient dependency mix data can serve as a qualitative guide to nursing personnel staffing decisions, it must be coupled with quantitative estimates of workload per patient by patient category to convert patient classification data into quantitative staffing guidelines. Patient classification is only a first step, but one that must be taken before successful nursing personnel staffing systems can be developed.

Reference

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Your Career as an MSC Officer

CAPT Paul D. Nelson, MSC, USN

Today, as in years past, the reasons for which young men and women enter the armed forces are varied. Equally diverse are the grounds on which military service career decisions are made. As career naval officers, each of us would undoubtedly have a slightly different story to tell, were we to review the circumstances and reasoning of our career decisions . . . or those made on our behalf. During a given year, MSC officers who share their thoughts with me by phone, letter, or personal visit reflect a variety of feelings, objectives, and values about their careers. Many seem quite frustrated, while some are disappointed. A few are frankly unhappy. By contrast, others are exceptionally pleased with the way their careers seem to be going.

For most of us, reevaluating one's career is a continuous process, not a single event in which a decision is made once and for all. Economics, life style, family, job assignment, personal achievement, and many other factors are weighed as we set objectives and proceed toward their attainment. It was for the purpose of sampling this process that the recent career survey of MSC officers was initiated at the Naval School of Health Sciences, Bethesda.

From the research literature, my personal experiences, and the attitudes expressed by MSC officers on other occasions, I expect the survey to reveal that professional challenge and responsibility are central to the thoughts and decisions of most officers about their careers. These factors seem inextricably linked as well to perceived opportunities for promotion, personal and professional growth, and a host of life's other related rewards. And in the minds of our officers, they are associated inevitably with jobs, positions or billets, and types of assignments—the structural elements from which careers are patterned. Hence, I frequently hear officers ask such questions as: "What is 'the right' career path for me to take in order to make captain?" Or, an officer prior or subsequent to nomination for reassignment might say: "I don't care where you send me, just as long as it's a 'challenging' job." And then, especially among our junior officers who undoubtedly have been "counseled," I also hear on occasion: "Is it true that if I get assigned to_____, it's a 'dead end?'" Finally, I frequently encounter the concern of officers in particular specialties or subspecialties who ask: "What sort of 'meaningful' jobs are there for an officer of my specialty beyond the rank of lieutenant? I don't want to do exactly the same thing as a commander that I did as a j.g., and there doesn't seem to be any place for me to go."

There is no question that officers evaluate jobs and assignments differentially in terms of their perceived relationship to professional progression and personal advancement. And there is probably a fair degree of consensus among our officers about the level of responsibility, challenge, and growth potential inherent within certain jobs or billets available to MSC officers. But I suspect that there are more differences than similarities of opinion among our officers about the professional desirability of most MSC billets, or about what constitutes a "good" or "bad" job assignment. And that is as it should be. For, despite what some might think, the MSC promotion or other professional advancement depend upon more than the job itself. Most important is the officer's performance relative to the responsibilities of whatever job he or she is assigned. Consequently, fitness reports are essential to an individual's career progression. Performance evaluations should reflect a composite of the demonstrated capabilities of an individual relative to the requirements of the job. In the course of a career, the variety of assignments can be important as well, even within a single specialty for which different levels of complexity and responsibility become critical factors over successive assignments. In that context, the timing of an assignment can also be significant. The way someone performs weighed against these and other factors forms a basis for estimating an officer's potential. In the article I wrote last year (*U.S. Navy Medicine,* August 1979), I listed the major criteria for middle senior grade officer assignment. Those are general criteria, of course, but applicable to officers of all MSC specialties.

Every job indeed reflects an aspect of the formal requirements of an organization. But each one also reflects a bit of the person performing it. For most jobs, the old adage "you get out of life what you put

CAPT Nelson is Director of the Medical Service Corps.

into it'' is true. Every job or assignment, therefore, should be regarded as an opportunity both to contribute and to learn. I often counsel junior officers to judge a job not by its title or its basic requirements, but by what it can offer in the way of challenge, personal and professional awareness, and growth.

Careers can be described in terms of ambitions and objectives, of achievements and failures, of interests and needs. In a structural sense, however, they can also be regarded as a lattice of jobs or assignments characterized by degrees or types of responsibility, challenge, and competencies. In the *Navy Supply Corps Newsletter,* July 1979, devoted to career guidance of officers in that corps, experience, training, and education are cited as major components of career development. The thoughts conveyed in that article are applicable as well to MSC officers. I quote: ''The experience, training, and education gained by officers contribute to their qualification for a given billet or billets. Each new experience will widen and/or deepen personal knowledge; but an officer's qualifications depend not only on acquired knowledge, but on the ability to apply it—to be reflected in performance. Career development should therefore not be thought of as a set of tickets to be punched, but as a continuous flow that widens, sharpens, and directs the potential of an officer for future service. The expertise gained by one person at a particular point in the flow may be gained by another at a different point and in a different billet.'' (*1*) That last sentence is especially important.

As MSC officers, our careers must be evaluated not only in terms of their professional merit to us, but primarily in terms of how effectively we support the Navy and Marine Corps operational forces. Indeed, as

1979-80 MSC Specialty Advisors

Health Care Administration Advisors
CDR R. McCullagh (Fiscal/Supply)
LCDR P. Truran (Fiscal/Supply)
CAPT H. Sowers (Patient Services/Quality Assurance)
CDR L. Moore (Patient Services/Quality Assurance)
CDR E. Wilson (Patient Services/Quality Assurance)
CAPT L. Angelo (Management Information Systems)
CDR G. Stewart (Human Resource Management)
LCDR T. Ruffin (Human Resource Management)
LCDR A. Frost (Food Service Management)
CDR R. Morin (Facility Operations [general])

Health Care and Science Advisors
CDR W.M. Beckner (Radiation Specialties)
CDR R. Newell/CDR R. Poquis (Optometry)
CDR J. Lucas (Pharmacy)
CDR P. McKelvy (Medical Specialists)
CDR H.F. Delaney (Occupational Therapy)
CAPT M. Springer (Dietetics)
CAPT E. Hockstein (Podiatry)
CAPT S.W. Joseph/CDR D. Woodman (Microbiology/Bacterial/Parasitol/Virol)
CDR D.E. Uddin (Chem/Biochem/Pharmacol)
CDR D. Schubert (Medical Technology)
CDR R. Peterson (Entomology)
LCDR W. Thomas (Environmental Health)
LCDR C. Baker (Industrial Hygiene/Audiology)

CDR R. Biersner (Physiology & Research Psychology)
CDR D.H. Reid/CDR W. McIntosh (Aero Physiology)
CDR R. McCullah (Clinical Psychology/Social Work)
CDR R.S. Gibson (Aero Psychology)

Institutional Advisors
CAPT D.A. Brandon (Marine Corps [general])
CDR A.S. Sasler (Surface Fleet [general])
CDR D.E. Wood (Research & Development)
CAPT W.J. Auton (Education & Training)
CDR E.R. Christian (Recruiting Program)
LCDR E.A. Donohue (Naval Reserve Programs)
CDR J.J. Kehoe (Dental)

commissioned officers we have obligations and responsibilities beyond those normally expected of our civilian colleagues in whatever professional specialty we serve. Our career development must prepare us for contingency readiness at all times, whatever our roles might be. In each assignment, we must continually develop and sharpen our leadership abilities, our awareness of the Medical Department mission, and the uniqueness of our roles as MSC officers in contributing to that mission. Although our civilian colleagues play an essential role in the Department of Defense, the commissioned officer, and petty officer too, must have a unique sense of purpose and commitment in his or her service.

For the professional soldier or naval officer, whose traditional career led to combat arms field commander or command at sea respectively, the uniqueness of professional role in a military service career was hardly ever questioned. In recent years, however, the career military officer role has been the subject of considerable academic and administrative attention. Notable among the earlier writers were Morris Janowitz, (*2*) distinguished professor of military sociology at the University of Chicago, and Samuel Huntington, professor of government at Harvard University. Both assessed the potential impact of post-World War II technological and political change on our military institutions generally and the professional officer in particular. (*3*) Much of what was speculated in their scholarly essays 15 years ago has become the reality of career development for military officers today, namely greatly increased technological specialization in addition to the more general and traditional military warfare role.

Among staff corps officers, for whom technical specialization of professional function has been the tradition, the uniqueness of the military officer role must be identified from the way in which professional service is rendered, professional readiness for contingency support of the operational line forces being the ultimate case in point. MSC officers must be better prepared through training and experience to complement their professional education in the various clinical, administrative, and scientific specialties of health services. This is what our career development planning must be about. Indeed, the development of prototypical models for MSC officer career planning has been the objective of highest priority to the MSC's BUMED staff during this fiscal year.

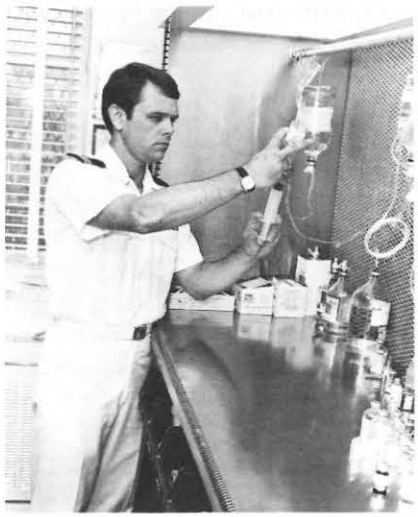
The idea of career planning in the MSC is not new. In 1960, RADM B.W. Hogan, MC, USN, the Surgeon General of the Navy, directed changes in personnel management so that "all officers of the Medical Service Corps will be provided with common career guidance, broadened opportunity, and career patterns permitting a greater variety of assignments." (*4*) But despite the efforts of a few individuals and some of the specialty communities of officers, standardized career development plans that could be used in counseling and strength planning for all MSC officers were not forthcoming. In the face of critical professional issues experienced in more recent years, VADM Willard P. Arentzen, MC, USN, espoused anew the need for career planning in all corps of the Medical Department during his tenure as Surgeon General.

Because of its diversity of professional disciplines and its comparable variety of roles or functions assumed by its officers, MSC is unique among officer staff corps in general. There is no single fundamental profession around which subspecialties develop as in law, medicine, engineering, or nursing. Because of this, the task of developing career planning models for the entire MSC is a difficult challenge. But I believe we have made significant progress toward that objective this year under the guidance of CAPT Cherry Hatten, Deputy for (MSC) Health Care and Science specialties, and CAPT Roy Tandy, Deputy for (MSC) Health Care Administration specialties. Assisting them in this endeavor were the MSC specialty advisors and LCDR Bob Brant, LCDR Sal Profita, and LCDR Ken Gibson of the MSC Division (BUMED) staff. LT Jeff Harrison has recently joined our staff to relieve LCDR Gibson, and several new specialty advisors will be working with us in the year ahead as well.

A related change in staffing is that pertaining to Medical Department officer detailing, a vital element of the career development process. LCDR Bob Brant and CDR Deane Schubert now serve as the assignment officers for MSC officers in the health care administration and health care and science professions, respectively. Located with other naval officer communities at the Navy Military Personnel Command, they will be working closely with the MSC Division on matters of career planning, with our specialty advisors on professional affairs, and with our officers themselves on matters concerning their next duty assignments.

The assignment process, of course, can be thought of as the implementation of a career development plan. If there is no plan, assignments must be left at best to a random strategy and at worst to one which is biased. Since assignments ideally should be based upon criteria of personnel qualifications relevant to billet or job requirements, other factors being equal, it is ex-

Photo by HM2 James Parmenter



LT Marvin Holt prepares a hyperalimentation IV solution in the NNMC Pharmacy.

Fleet liaison duties are among assignments of MSC personnel.

tremely important in career planning that such information about billets and personnel be accurate, up-to-date, and professionally appropriate. For the reason, we have devoted considerable attention again this year to the MSC billet structure and to the further development of an officer qualifications inventory. We have much work yet to do, in concert with the other Medical Department corps and the BUMED Manpower Division. And since billet requirements are subject to change periodically, this effort is likely to be continuous. Nevertheless, there should be a skeletal structure of requirements, and therefore billets on which to base the nucleus of our career planning.

Senior officer billet requirements serve as the validating criteria for officer career plans. In other words, they represent the performance capability objectives toward which officers must be prepared through a combination of education, training, and job experience over their career. There are requirements for senior MSC officers in highly specialized fields as well as in the seemingly more general assignments (though the latter often are more specialized than one might think). In most instances, however, the responsibilities of a senior officer include executive level administration or program management, whether at field or headquarters activities, in the fleet or ashore, in a health care facility, or in research, training, preventive medicine, or other support activities. Even in the clinical specialties, a senior officer billet should require leadership and administrative competence at the departmental, regional, or headquarters level.

For professional health care administration officers, requirements and opportunities for career specialty tracks exist in the following areas: financial management; supply and medical logistics; facilities planning and operating management; patient services and quality assurance; food services management; human resource management; and medical information systems management. In some instances, officers may develop subspecialties or multiple specialties among these areas. Among still other functional areas in which Medical Department requirements exist for specially qualified officers, contract management, contingency planning, and health care policy analysis are examples. These areas may draw upon officers from a variety of specialty backgrounds, but with additional training.

For officers of the clinical and science specialties of which there are so many, we have been assessing the similarities in professional education, jobs performed, and activities in which they are billeted in order to seek broader categories for career planning. This was driven in part by our analysis of contin-

gency requirements and also by a growing number of middle to senior grade billets for officers who may come from any one of several clinical or science specialties. One result has been the concept of specialty clusters of clinical and science disciplines as a management tool. The basic idea of clustering is to simplify career planning guidelines for specialties that are similar in function even if not in the specific graduate training or skills.

The environmental sciences, a cluster of environmental health, industrial hygiene, entomology, and radiation health specialties, are a case in point. By training and experience, some of the officers in chemistry, physiology, radiation physics, and the microbiological sciences also qualify for inclusion in that cluster. Their mission is essentially to support preventive medicine and occupational health programs. CAPT Hatten works with the advisors of these specialties not only as individuals but also as a team in reviewing program and billet requirements and developing career plans. Other possible health care and science clusters are the clinical health care services, the clinical support technologies, and the operational human performance sciences. Some professional specialties can be classified in more than one cluster.

Finally, in addition to the issue of specialization, there is a rather simple concept and administrative mechanism which facilitates career development in the military service, namely assignment rotation. The purpose of rotation, at least for staff corps officers, is not so much to allow geographic or climatic variation of assignments, as some might think (though it can indeed do that), as it is to allow opportunities for professional growth and career development. Tours of duty with the operational forces, in overseas activities, in CONUS field support activities, and on headquarters staffs all have a purpose in officer development. In the past, it was not uncommon for MSC officers to devote most of their careers to particular types of duty stations. Some specialized in hospitals, some in headquarters staff assignments, some with the Marines, etc. In the future, I hope that our officers will be more broadly developed in terms of duty assignment variety because it allows a richer perspective of mission, fosters professional development of a staff corps officer in greater depth, and increases the likelihood of a "single naval service" spirit.

In the most general case, MSC officer assignments will allow broad orientation to one's profession and to one's role as a naval officer during the first two tours of duty. An initial operational tour or a substitute such as junior officer staff duty, overseas assignment, or CONUS fleet or other line support activity will be included as billets require, generally on the second tour. The next two or three tours will allow professional specialty development in depth, with increasing levels of complexity and responsibility. In-service and out-service training and continuing education, as well as contingency role development, should be emphasized during this period. Junior service college opportunities will also be available at the time. As the officer develops into the upper middle and senior grades of rank, the assignments reflect a continuation of specialization into executive levels for some and a divergence toward more general management functions for others. Service needs, officer interests, and officer capabilities are all part of the basis for those assignments.

These are some of our thoughts and plans. More definitive guidelines are under development for dissemination to MSC officers for comment. We want you to discuss and evaluate those guidelines and give us your reviews. In an iterative manner of refining each set of guidelines, we will hopefully develop a useful tool for officer counseling and career planning in general. Some years ago, as a specialty advisor, I developed a draft career plan for officers of that specialty. I will always recall the remarks of two equally competent, but different, officers. One remarked that the plan "looked like a typical bureaucrat's idea of what my life should be like," while the other officer was equally quick to say that "this is what I had hoped would exist when I joined the Navy!" I expect to hear more of the same this time around as well.

I am optimistic about professional opportunities for all MSC officers. Two of every three on active duty today are career officers. We are more highly educated than ever before, though in great need of many new training programs which are either in development or in a concept state at this time. MSC officers have more command and senior headquarters staff officer opportunities today than ever before. I fully anticipate even more and different opportunities ahead. The Medical Service Corps is a growth opportunity by any standard —and that is what your career should be as well.

Happy birthday on this 33rd anniversary of the Navy Medical Service Corps!

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1. *Navy Supply Corps Newsletter.* July 1979, p 8.
2. Janowitz M (ed): *The New Military.* New York, Russell Sage Foundation, 1964.
3. Huntington SP: *The Soldier and the State.* Cambridge: Harvard University Press, 1957.
4. *U.S. Navy Medical Newsletter* 35(7): 18-19, 1 April 1960. □

Physician Becomes Flight Surgeon

The Navy lieutenant struggled from the cockpit of the two-seater plane as he completed the last of his training flights. Soon he would be wearing gold wings on his chest.

But Stephen D. Landaker, M.D., was not learning to become a Navy pilot. The 28-year-old doctor from Las Vegas, NV, was ending six months of flight surgeon training at the Naval Aerospace Medical Institute at Pensacola, FL. He graduated on 8 May 1980.

Unlike the image late-night television viewers may have of a flight surgeon—dashing to pull an injured pilot from his flaming fighter before bombs and rockets explode—the modern flight surgeon is a man of science.

The intensive six-month program doesn't permit detailed training in any specific medical specialty or subspecialty, but it is more refined than most people realize.

There's a thorough review of general medicine with emphasis on ear, nose, and throat problems. The doctors also study such complex subjects as environmental physiology of flight, neuropsychiatry, ophthalmology, and cardiology.

"I think the most interesting medical part of the training here has been the physiological aspect of the high altitude environment," stated Dr. Landaker. "Also, there are the particular stresses of high performance aviation, such as change in atmospheric pressure and temperature differences."

But there's more to the course than just medicine. There is basic flight training that usually stops just short of the solo flight requirements that a Navy pilot must complete.

"I really enjoyed the flying," the doctor continued. "I've had a longtime interest in it and when I was applying for medical school I thought about becoming a pilot if I wasn't accepted."

Dr. Landaker makes a thorough preflight inspection of his aircraft during flight surgeon training.

In addition, the doctors undergo intensive training in land and sea survival. Using "dunker" training devices, the students learn how to escape from aircraft that have crashed into the water and sunk. Then they are dropped from a helicopter into the chilly waters of nearby Pensacola Bay where they practice escaping from a parachute harness, inflating a rubber life raft and climbing into it in open water with not-so-gentle winds blowing.

In the land phase, they spend three days and two nights in a swamp practicing survival, much as a downed pilot might have to do, by making meals and shelter out of what they can find.

Dr. Landaker said he became interested in medicine during high school. "I always enjoyed the medically related sciences and had a desire to help others," he explained.

He earned a bachelor of science degree in premedical studies from the University of Nevada in Reno. Next came medical school. After two years at the University of Nevada's medical school, also in Reno, he transferred to the Tufts University School of Medicine in Boston, MA, where he earned his degree in 1978.

"I attended medical school under the Armed Forces Health Professional Scholarship Program," he said. "Under this program, I became obligated for one year of military service for every year of school."

He began his active duty with a medical internship at the Naval Regional Medical Center in San Diego.

"Because I was interested in flying, I applied for the flight surgeon program," he added.

Completing his training here, the doctor has been assigned to the 3rd Marine Air Wing based at El Toro Marine Air Station, CA, as a flight surgeon for fighter, attack, and helicopter squadrons.

Eventually, Dr. Landaker would like to get an orthopedic residency and then go into orthopedic surgery.

—Story by John Bacheller. Photos by Mike McCabe. □

Fellowships in Dental Research

CAPT M.R. Wirthlin, Jr., DC, USN

The Navy Postdoctoral Fellowship in Dental Research is offered at the Naval Dental Research Institute, Great Lakes, IL, and the Naval Medical Research Institute, Bethesda, MD. The postdoctoral fellowship program is a 12-month in-service period of academic and practical training designed to improve the competency of the general dentist in the area of a single specialty discipline. (*1*) The program in research is part of the Navy's preparation for future Medical Department roles in health care systems and general support of the operating forces. The research community is an integral part of Navy medicine and dentistry in general, working closely with the clinical, operational, and teaching communities, as well as those of science and technology.

The program has four parts: 1) indoctrination, 2) practical training, 3) academic, and 4) special project. The indoctrination period provides review of goals, strategies, problems and objectives of the research program, and review of current research work units. The practical training includes at-the-bench familiarization with equipment and methods in dental research. The academic portion includes seminars, literature review, and tutorial assistance in research design, caries and periodontal diseases, oral surgery, microbiology, epidemiology, histopathology, biochemistry, cell culture, and veterinary anesthesia. Also offered are formal courses, such as in statistics, at nearby universities, and opportunity to review the complete range of Navy dental research projects and facilities. The postdoctoral fellow is expected to select and conduct an independent research project, with one or more of the staff as research advisors. The program is directed by a senior naval dental officer investigator and a committee of senior scientists.

Dr. Meiers works on his clinical investigation project involving occlusal surface pit and fissure decay.

At the completion of the year of research fellowship, the candidate presents written and oral reports of his investigation, and is awarded a certificate. Completion of the postdoctoral fellowship does not preclude future assignment to courses at the National Naval Dental Center, long courses of instruction in civilian universities, or to other military facilities. A number of the present dental research investigators started their careers in the postdoctoral program. No service obligation is incurred for postdoctoral fellowship training.

A dentist, LT Jonathan C. Meiers, DC, has just completed the research postdoctoral fellowship at Great Lakes, IL. Dr. Meiers reported to Great Lakes after a tour of duty at the Dental Department, U.S. Naval Station, Keflavik, Iceland. At Keflavik, he practiced general dentistry and also served as Training Officer and Preventive Dentistry Officer. Dr. Meiers especially liked the challenge of changing patient's attitudes toward their oral health. He and his shipmates earned the Meritorious Unit Commendation while at Keflavik.

Dr. Meiers had a strong background for his research experience. He received honors for his outstanding academic records during predental studies at the University of Connecticut, and also at the School of Dental Medicine, University of Pennsylvania. His first tour of duty in the Navy was a general practice residency at NRMC Portsmouth, VA. He states that he not only enjoys reading about new clinical techniques but also studying about the

Dr. Wirthlin is Commanding Officer, NDRI Great Lakes, IL 60088.

biological aspects of periodontal diseases, oral pathology, and caries. His current interests are in restorative dentistry and cariology.

Dr. Meiers special project at Great Lakes was an independent research work unit entitled, "The Bacterial Flora of Incipient Occlusal Lesions in Naval Recruits." In this investigation, he discovered that previous studies of pit and fissure dental decay had only studied the bacteria found at the entrance to fissures or had used artificial models of the colonization of dental fissures. He perfected a method to sample the flora within fissures, using a rubber dam to isolate the teeth, disinfecting the operative field, and collecting the waste slurry generated by washed-field tooth cutting procedures. He cultured, subcultured and identified the isolates in the microbiology laboratory, learning a great deal about the odontopathic microorganisms involved in dental caries. His results are significant in paving the way for new methods of prevention and control of dental caries in Navy and Marine Corps personnel. He intends to submit his work in the Hatton Award competition of the International Association for Dental Research.

Navy dental officers interested in clinical and scientific research training in biochemistry, microbiology and immunology, microanatomy, physiology, and epidemiology in support of problems in battle injury, pulp biology, oral disease prevention, and oral health care delivery should contact the Director, Oral and Dental Health Program, Naval Medical Research and Development Command (Code 48), National Naval Medical Center, Bethesda, MD 20014.

Reference

1. Dental Officer Education Program. *NAVMED P-5093.* □

BUMED SITREP

MEDICO-LEGAL FEEDBACK: COOPERATION WITH INVESTIGATORS

On occasion it is discovered that a health care provider has refused to provide information to NIS or a similar investigative agency without the consent of the patient (the subject of the investigation). This note provides guidance on that subject.

Although the ethics of the medical profession forbid unauthorized disclosure of information acquired in a professional capacity, in the military, no legal privilege attaches to medical records or to information gained from a patient during examination and treatment. Rather, the protections of the Privacy Act of 1974 (5 USC S552a) govern the release of such information.

The Privacy Act is implemented within the Department of the Navy by SECNAVINST 5211.5A, paragraph 7b(1) of which provides, in pertinent part, as follows:

(1) *Intra-agency.* Disclosure may be made to personnel of the Department of the Navy or other component of DOD . . . who have a need for the record in the performance of their duties, provided this use is compatible with the purpose for which the record is maintained. This provision is based on the "need to know" concept.

(2) This may include, for example, disclosure to . . . discipline officers, courtmartial personnel, . . . investigating officers, and representatives of . . . the *Naval Investigative Service,* who require the information in order to discharge their official duties. . . . (Emphasis added.)

In addition, DODDIR 6040.2 of 13 Sept 1967 provides, "Medical information shall be released, upon request, to the departments and agencies which have a proper and legitimate need for the information."

In view of the foregoing, it is inappropriate not to comply with a request for NIS, an investigator appointed to do a JAG Manual investigation, etc., for medical records or information needed in the course of their assigned duties. All medical personnel should be reminded of this point.

MEDICAL EFFECTS OF NUCLEAR WEAPONS COURSE

The Armed Forces Radiobiology Research Institute will sponsor this course on 20-24 Oct 1980. The program is offered to physicians and other Medical Department officers who would possibly be associated with radiation injuries. Funding will be provided by HSETC. Nominations should include (a) Name, (b) Rank/designator, (c) Social Security Number, (d) Security Clearance (SECRET required), (e) Officer's telephone number (autovon and commercial), and address for correspondence. Commands will be required to submit certification of SECRET or higher clearance for all selectees in writing to Director, AFRRI, Attn: Security, NNMC/Bldg. 42, Bethesda, MD 20014. Commands should submit nominations to BUMED (Code 21), no later than 25 Aug 1980. Nominations should include names of officers previously nominated but not selected and still desiring to attend course.

CDR (now CAPT) Richard Stratton, USN, after his release in 1973 and as filmed in a Hanoi prison by an East German camera crew in 1967.

(Lower right) LCDR (now CDR) Rodney A. Knutson, USN, demonstrates an exercise he and his fellow inmates practiced while in captivity. This self-imposed regimen helped them survive their ordeal in reasonably good condition.

Courtesy CAPT Stratton

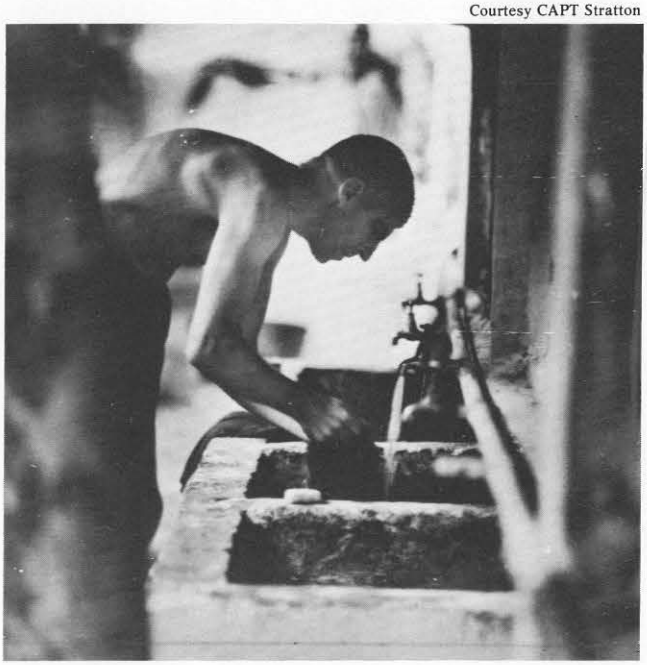
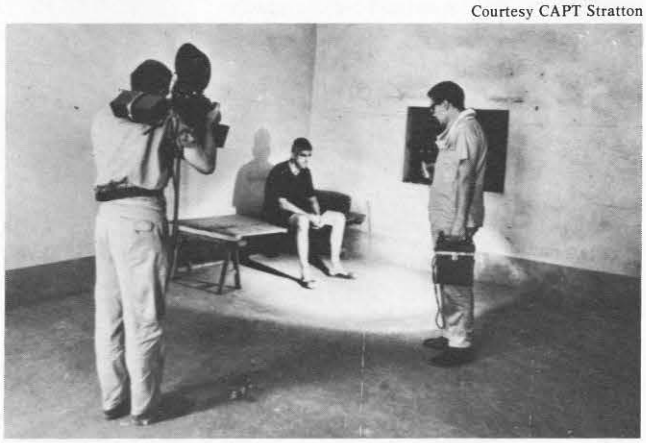


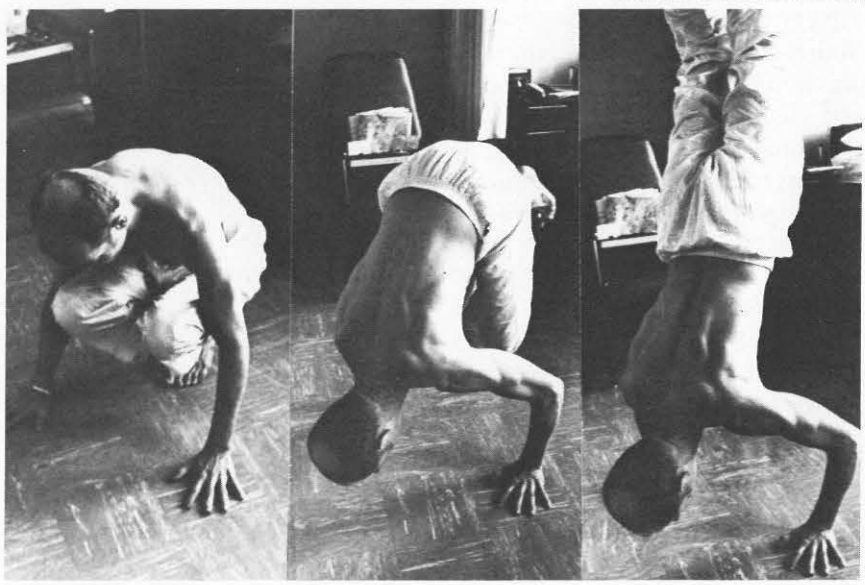
Photo by HMC Steve Spring, USN

Courtesy CAPT Stratton



Courtesy CAPT Stratton

Photo by HMC Steve Spring, USN



Five-Year Medical Followup of Vietnam POWs: Preliminary Results

Milton Richlin, Ph.D.
CAPT Richard H. Rahe, MC, USN
LCDR John H. Shale, Jr., MC, USNR
CAPT Robert E. Mitchell, MC, USN

Historically, Americans held prisoner of war by Asian captors have fared poorly, both during and following captivity. During World War II, for example, approximately 38 percent of the 33,000 Americans captured by the Japanese died during captivity. This mortality is in stark contrast with a one percent mortality seen among Americans captured in the European and Mediterranean theaters of operations. Again, during the Korean conflict, approximately 38 percent of the 7,000 Americans captured died during captivity. Though precise figures are difficult to obtain for the Vietnam experience, Defense Department estimates put mortality of Americans held in captivity at approximately 15 percent.

The stress of the prisoner of war experience includes disease, physical abuse, malnutrition, and psychological torment. Moreover, the effects do not end with repatriation. Several studies, most notably those by the National Research Council under the sponsorship of the Veterans Administration, have demonstrated an excess morbidity and mortality for repatriated Asian-held POWs that have persisted over 20 to 25 years. (*1,2*) This increased morbidity and mortality was evidence by comparison of these men to control groups who had served in identical military theaters of operations but had not been held captive.

Released from a Hanoi prison in February 1973, CAPT (now VADM, Ret.) James B. Stockdale, USN (top right) and COL Robinson Risner, USAF (waving), arrive at Clark Air Force Base.

Dr. Richlin is Head, Prolonged Stress Branch, Stress Medicine Division, Naval Health Research Center, San Diego, CA 92138. Dr. Rahe is Commanding Officer, Naval Health Research Center and acting Division Head, Stress Medicine Division. Dr. Shale is Flight Surgeon at Marine Aircraft Group 39, Camp Pendleton, CA 92055. Dr. Mitchell is Head, Special Studies Service, Naval Aerospace Medical Institute, Pensacola, FL 32512.

LCDR Everett Alvarez, USN, captured in 1964, spent eight and a half years as a POW. Here, he heads the line of the first group of POWs to be released.

Not surprisingly, than, authorities expected the worst in preparing for repatriation of American POWs from Vietnam in 1973. Further causes for worry about the health of these men were that the average duration of captivity was considerably long (by several years) than had been the case in any earlier wars and it was known that torture had been applied by the North Vietnamese captors. In preparation for repatriation, the Department of Defense set up a full program of medical and psychological evaluation and treatment called "Operation Homecoming." Full and proper medical care upon return was provided in hopes of minimizing long-term sequellae of captivity. A five-year followup program was initiated, the major purposes of which were to continue to provide very thorough medical examinations for the men annually; to provide any necessary social services to the families; to make a careful study of the effects of the severe stress experienced both by the men and by their families; and to study the conditions of captivity and the methods of coping with captivity in order to provide such knowledge to high-risk personnel involved in future conflicts.

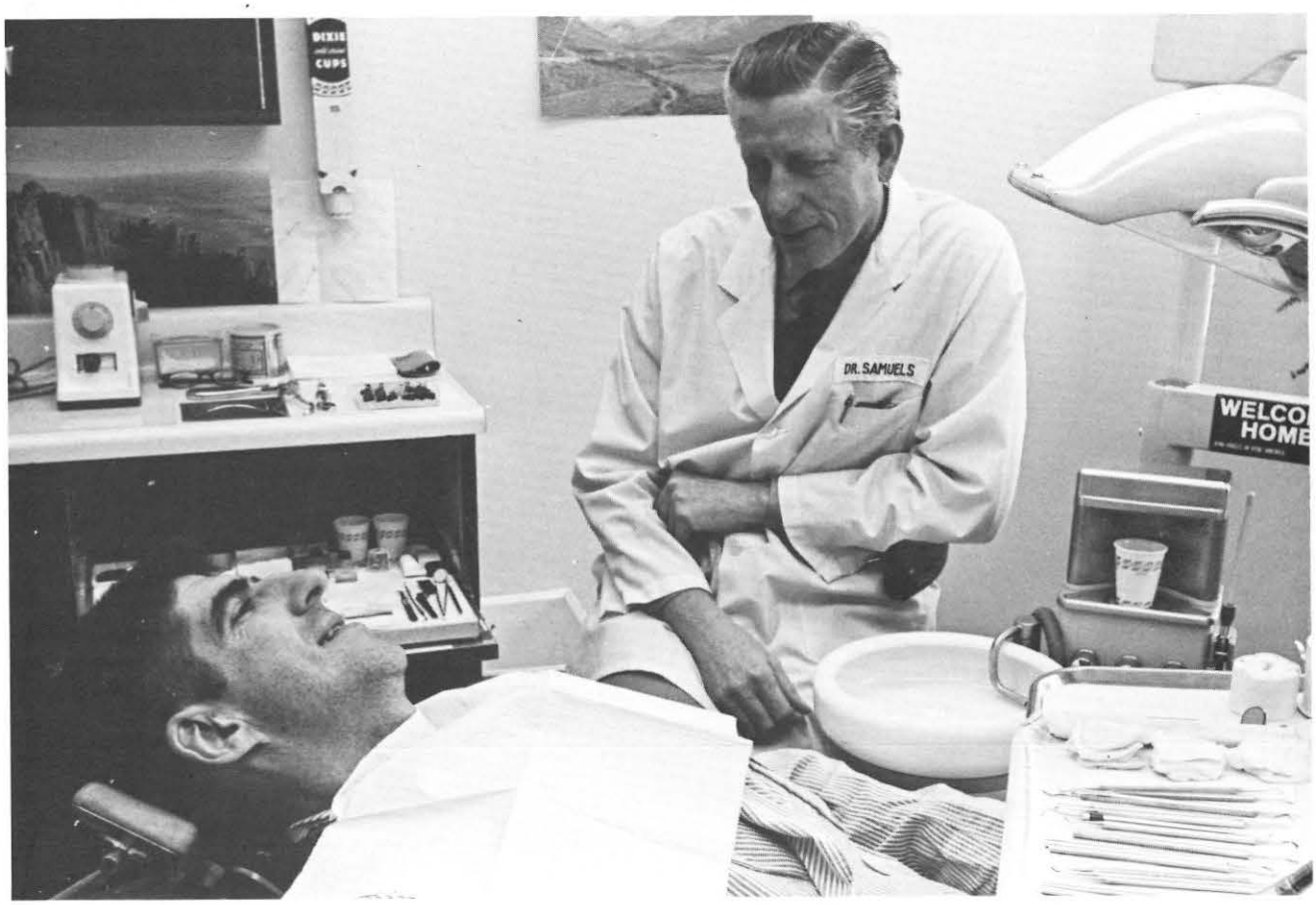
The Navy has elected to continue the medical followup program for an additional five-year period. In order to permit a more complete understanding of the findings of the medical followup, the Navy has also initiated annual examinations for a control group. This paper will present the results of the most recent physical

examinations for the Navy repatriated prisoner of war (RPW) group and their Navy controls.

Methods

RPW and Control Subjects. The total Navy RPW group was comprised of 138 flight officers at the time of repatriation in 1973. The control group was selected from a list of naval aviators who had been flying combat missions over Vietnam during the same time period as the RPW who had been shot down. (*3*) Matches were made on nine variables. First, each control subject had to be flying combat missions over Vietnam within one year of the date that his matched RPW was shot down. The next variable was age at time of shootdown for the RPW (which was a mean of 30.8 years for the RPWs versus 30.5 years for controls). Two additional matching variables, highly related to age, were rank at time of shootdown (a mean of "lieutenant" for both RPW and control groups) and year of entry into the Navy as an officer (a mean of August 1959 for the RPWs versus July 1959 for the controls). In terms of Navy occupation, 70 percent of the RPWs were pilots versus 71 percent of the controls. The remainder of the samples in both groups were bombardier/navigators, or radar intercept officers. Mean education level was 15.5 years for both groups. In terms of marital status, 75 percent of the RPWs were married versus 76 percent for the controls; 25 percent of the RPWs were single versus 22 percent for controls; none of the RPWs were divorced compared to two percent of the controls. The eighth matching variable was number of flight hours; mean flight hours for the RPWs was 2,022 compared to 2,135 for controls. The final matching variable was type of aircraft flown. Interestingly enough, the two groups proved to be remarkably similar along other parameters which were not included in the matching. For example, mean IQ scores for the two groups were within one-half point of each other and mean profiles on the Personality Research Form were almost a perfect overlap.

The present sample is comprised of 57 matched pairs selected to be representative in terms of age, rank, and



Courtesy CAPT Stratton

CDR Stratton is given dental treatment after his repatriation.

TABLE 1. Organization of the NAMRL/NAMI Medical Followup Exams

Medical History: Duke Medical History; SF-93; NAMI Complaint Form.

Physical Examination: Duke Physical Exam; SF-88; FAA Certificate.

Radiographic: Chest; KUB; Consult.

Laboratory: Hemograph; Urinalysis; SMA 24; Glucose Tolerance Test; Lipids & Electrophoresis; Proteins & Electrophoresis; Immunoglobulins; Consult.

Cardiology: EKG-Routine; EKG-Treadmill; Ballistocardiogram; Vectorcardiogram.

Respiratory System: ENT Consult; Pulmonary Function Studies.

Audiology Consult: Audiometric Report.

Ophthalmology Consult: Visual Function Report.

Psychiatric Consult: Mental Status Exam; Personality Research Form; Recent Life Changes; Halstead-Reitan Neuropsychiatric Test; Wechsler Adult Intelligence Scale, Social Work; Consult.

Dental Consult

Special Consults: Dermatology; Neurology; Orthopedic Surgery; Urology; etc.

TABLE 2. Hospital Admission Rates*
(from Beebe, 1975, p. 408)

	World War II					
	Europe		Pacific		Korea	
	PW	C	PW	C	PW	C
Infective	7.1	6.2	46.7	13.2	30.3	7.3
Neoplasms, malignant	0.8	0	0	0	0	0
Neoplasms, benign	2.4	0	3.5	2.8	5.2	4.4
Allergic, endocrine	2.4	0	18.1	2.4	4.8	1.0
Blood	0	0	1.2	0.5	0.4	1.0
Mental	11.1	0.9	36.7	3.3	26.0	9.2
Nervous system	3.2	2.7	12.4	3.3	10.9	6.8
Circulatory system	2.4	3.6	9.3	6.1	15.2	4.4
Respiratory	17.4	11.6	31.6	16.5	35.5	37.2
Gastrointestinal	19.0	8.1	31.3	12.3	30.4	17.9
Genitourinary	3.2	7.1	8.9	4.7	13.0	8.7
Skin	3.2	8.9	15.8	5.2	14.7	9.7
Musculoskeletal	11.1	4.5	14.7	4.7	10.0	11.1
Symptoms	11.1	4.5	23.1	7.1	13.4	7.7
Accidents	17.4	17.0	29.7	23.1	47.3	35.8

*Admissions per 1,000 per year during four years post repatriation.
Note: Underlined entries: $p<.05$ in tests of PWs *vs.* Controls.

duration of captivity of the entire sample of Navy RPWs.

Medical and Dental Examinations. After the initial medical examinations and treatment conducted during Operation Homecoming in naval hospitals across the country, all Navy RPWs have reported annually to the Naval Aerospace Medical Institute and the Naval Aerospace Medical Research Laboratory in Pensacola, FL, for subsequent annual examinations, as shown in Table 1. After selection of the control group in 1975, they too reported to Pensacola for identical examinations. The first examination for controls was in 1976, the third year of followup for the RPW group.

Current Analysis. Over the first two to three years following repatriation, RPWs showed relatively high illness rates as they obtained corrective orthopedic surgery, had needed dental work performed, resolved psychological problems, etc. (*4-7*) The current impression is that these early high illness rates have declined markedly. (*8*) The present paper examines if the current (fifth year after return) prevalence of disease in the RPWs is significantly different from that of their matched controls.

Results

To preface our results, Table 2 presents some of the results obtained by investigations of American World War II and Korea POWs following their return to the U.S. This table is based upon the work of Beebe and others at the Medical Followup Agency of the National Research Council. (*1*) Note that these data are *hospital admissions,* per thousand men, per year, over the first four years following repatriation. The rates of hospitalization among POWs of Japanese captors was significantly greater than that for controls, as well as much higher than the rate seen for RPWs from Europe or Korea. Mental disorders, ranked second for RPWs from the Pacific, were fifth for European and Korean RPW groups, sixth for Korea controls, and eleventh for World War II controls. Beebe felt that of all diagnostic categories, mental disorders showed the greatest excess in RPWs from Asian countries.

Turning to the present study, our results are *not* hospital admissions data. Rather, these diagnostic data are the results of the men's latest thorough annual examinations. In the following tables, *frequencies* of diagnoses from these exams are presented (some individuals accounted for more than one diagnosis, however). It is important to bear in mind that as a result of these detailed medical examinations, most individuals would receive at least one diagnosis. Also, very few of these diagnoses were of such severity that they have led to hospital admissions for their treatment.

TABLE 3. Medical Followup 1978-79

ICDA-8 Diagnostic Category	Frequency of Diagnoses RPW*	Control*
Infective and parasitic diseases	7	2
Neoplasms	2	4
Endocrine, Nutritional, and Metabolic Diseases	2	10
Diseases of Blood and Blood-Forming Organs	1	0
Mental Disorders	14	12
Diseases of the Nervous System and Sense Organs	73	84
Diseases of the Circulatory System	5	9
Diseases of the Respiratory System	28	30
Diseases of the Digestive System	2	5
Diseases of the Genitourinary System	1	3
Diseases of the Skin and Subcutaneous Tissue	6	12
Diseases of the Musculoskeletal System	6	7
Symptoms and Ill-Defined Conditions	1	3
Accidents, Poisonings, and Violence	2	4
Total	150	185

*57 matched pairs; stratified random sample

Table 3 presents the diagnostic frequencies for our Navy RPWs versus control groups, for all 17 etiological categories as organized by the Internal Classification of Disease Agency (ICDA), 1978. No significant differ-

TABLE 4

Diagnosis	Frequency RPW	Frequency Control
A. Neoplasms		
Malignant Neoplasms of Thyroid Gland	1	
Exostosis	1	2
Benign Neoplasm/Salivary Gland		1
Malignant Neoplasm/Other, of Skin		1
B. Diseases of the Circulatory System		
Essential Benign Hypertension/Diastolic		1
Chronic Disease of Endocardium/Other	1	
Heart Block, Miscellaneous Type/Including BBB	1	
Disorder of Heart Rhythm/Misc. or Unspecified		3
Ill-Defined Heart Disease/Misc. or Unspecified	1	
Hemorrhoids		1
Varicose Veins of Scrotum/Varicocele		3
Lability of Blood Pressure	2	1
C. Diseases of the Respiratory System		
Acute Pharyngitis		1
Acute Upper Respiratory Infection	3	1
Chronic Bronchitis		1
Maxillary Sinusitis, Chronic		2
Sinusitis (Chronic)/Miscellaneous or Unspecified	1	
Deflected Nasal Septum	21	22
Allergic Rhinitis	1	3
Disease of Upper Respiratory Tract/Misc. or Unspecified	1	
Disease of Lung/Miscellaneous	1	

ences in frequencies for any diagnostic category were found between the two groups of men.

In Table 4 we report on three categories of diagnoses that are of particular interest in the United States, as they are responsible for a substantial portion of annual deaths—neoplasms, circulatory disease, and respiratory illness. It is apparent that the diagnoses found among the 57 pairs did not represent any significant morbidity among the persons studied. For example, among the neoplasms, only the thyroid adenoma would be a life-threatening disease. In the diseases of the circulatory system, none of the diagnoses represented a life-threatening disorder. Finally, among the diseases of the respiratory system, we found that the largest single category was deviated nasal septum, a diagnosis which is more a reflection of the care of the physical examination than an indication of serious illness.

The categories of illness presented in Table 5 are noteworthy because of the findings of suspected organic brain disease in civilian personnel held by the Nazis in World War II, including concentration camp survivors. (*9*) The important point to be made here is that no serious neurologic disorders were seen; the greatest proportion of diagnoses reflected minor visual or auditory deficits. The control group outnumbered the RPW group in the impaired hearing category, which

probably reflects the continued exposure of the control group to the noise of flying jet aircraft while the RPW group was held in captivity.

Table 6 presents data on psychiatric diagnoses for the two Navy groups. Once again, no significant differences are seen between groups for any diagnostic categories.

The final table shows the results of provocative tests conducted during the medical evaluations. These tests were run in an attempt to diagnose subtle degrees of dysfunction not apparent during a routine physical examination. They also are used to monitor changes due to aging. The only noteworthy differences seen between the groups occurred in the category Obstructive Pulmonary Defects. The differences are probably methodological, since a single Navy physician (CAPT Robert Mitchell, MC, USN) examined and evaluated all RPWs while two other Navy physicians (CDR Norman Holger, MC, USN, and CDR Gordon Kellogg, MC, USN) saw the controls. If mild and moderate obstructive defects are combined in Table 7, total defects are 18 for RPWs and 14 for controls.

TABLE 5. Diseases of the Nervous System and Sense Organs

Diagnosis	Frequency RPW	Control
Disease of the Brain/Misc. or Unspecified		1
Other Diseases of Peripheral Nerves Except Autonomic/Ulnar Nerve	1	
Myopia		1
Astigmatism		1
Refractive Errors		
Defective Visual Acuity	22	13
Defective Near Visual Acuity	16	19
Miscellaneous or Unspecified	1	
Hypertropia		1
Chalazion		1
Otitis Externa	2	3
Otitis Media	1	
Disease of Ear or Mastoid Process/Misc.		2
Impairment of Hearing	30	42

Conclusions

Navy Vietnam RPWs are doing well by any standards and, when compared with American prisoners from other wars, they are doing particularly well. Why is this so, in view of the fact that their mean length of captivity was much longer than prisoners from previous wars? The answer probably lies within a complex of several factors. First, it must be remembered that these men represented a very select group. All were officers, older, and committed to doing their best in very adverse circumstances. Secondly, these RPWs were given careful and detailed medical examinations at repatriation and provided with long-term medical followup. Thirdly, psychiatric and social support was provided to many men and their families at the time of repatriation, up to the present in some instances. Fourth, these men received POW survival training prior to captivity as personnel at high risk for possible capture.

It must be emphasized that only Navy RPW and control groups were examined in this paper. Army and Marine Corps RPWs differed from the Navy men in a variety of ways. First, they tended to be captured in South Vietnam, were generally younger, and 65 percent were enlisted personnel. The illness consequences of being held captive in the South, in terms of greater nutritional deprivation and prolonged maltreatment have been presented previously. (*10*) We are currently analyzing the results of the fifth year examination for these Army and Marine Corps RPWs. As there is no control group for these men, it will be difficult to draw meaningful conclusions about their health except in comparison with RPWs from previous wars as well as compared to their status at "Operation Homecoming."

While we are very encouraged about the current health status of the Navy RPWs, no one is sanguine about it. The medical followup program has been continued for an additional five years by the Surgeon General of the Navy. This indication of continuing concern for providing the finest possible medical care for this group of men will also mean an opportunity for continued scrutiny of their health as many of the men

TABLE 6. Mental Disorders

Diagnosis	Frequency RPW	Control
Anxiety Neurosis	1	
Depressive Neurosis		1
Obsessive-Compulsive Personality	3	1
Hysterical Personality	3	
Personality Disorders/ Miscellaneous	1	2
Habitual Excessive Drinking	2	2
Psychophysiologic Disorder	1	1
Transient Situational Disturbance	3	5
Total	14	12

TABLE 7. Provocative Tests

Provocative Tests	Frequency of Abnormal Results RPW	Control
Graded Exercise Test (GXT)		
Change in Rhythm During GXT		
Change in Rhythm Following GXT		2
Change in Pattern During GXT	1	
Change in Pattern Following GXT	5	3
Borderline Abnormal Exercise ECG	1	
Abnormal Routine ECG		1
Abnormal Vectorcardiogram		1
Abnormal Ballistocardiogram (Grade 1)	8	9
Minimal Obstructive Pulmonary Defect	6	
Mild Obstructive Pulmonary Defect	1	14
Moderate Obstructive Pulmonary Defect	11	
Minimal Restrictive Pulmonary Defect		
Moderate Restrictive Pulmonary Defect		2

retire from active service. Whereas few provocative cardiovascular diagnostic tests were positive, one fatal acute myocardial infarction was experienced this year by a Navy RPW. The major goal of these studies is to be ever alert to subtle health changes so that early treatment of these maladies can be accomplished to avert more serious consequences of unchecked disease processes.

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POW Doctor

CAPT Robert E. Mitchell, MC, USN, has been actively involved with the continuing evaluation and treatment of returned Vietnam POWs since 1973. The strong bond of affection that has developed between Dr. Mitchell and the men is a result of his continuing concern for their welfare and that of their families. U.S. NAVY MEDICINE recently talked with Dr. Mitchell at his home base at the Naval Aerospace Medical Institute, Pensacola, FL.

USNM: Dr. Mitchell, you've known and worked with the POWs ever since they returned seven years ago.
Dr. Mitchell: The only way I could be successful with the group was to develop a rapport so that they were willing to talk to me regardless of what develops. I assured them from the very beginning that I would make every effort to keep them in a flight status consistant with the safety of the individual and others. If I see one who will be a hazard to himself or others, I will ground him. There's one individual, for example, who was critically injured when he ejected over North Vietnam. He looked terrible orthopedically. By all rights, he should have been grounded. We brought him before a special board of flight surgeons, and in order to demonstrate his ability, he did 15 pullups one after another and then got down on the deck and did 100 pushups one after another. It's hard to say that that man cannot fly an airplane. He just completed a tour of duty aboard a carrier in which he commanded a squadron flying every day. I have tried to keep people like this on flight status.

I understand that many of the injuries these men sustained either when they were shot down or while in captivity were not adequately treated by the North Vietnamese.

Most injuries were treated very superficially. The treatment was at best mediocre. The only individual they made an effort to treat adequately was John McCain, and only because they didn't want him to die. It would have had a tremendous political impact. His father was commander in chief of the Pacific Fleet. They felt that by having John in custody, they had leverage. A number of the men were critically injured when they ejected, having done so at speeds anywhere from 4 to 600 knots. A number sustained injuries either when they hit the ground or were injured by their captors.

It has been said that this group of men withstood their captivity better than prisoners from our other wars.

Yes, but one must recognize that we're dealing with a different population. One hundred forty-one of these individuals who were either Navy or Marine Corps personnel were above average intelligence, with an above average will to live and an above average desire to show their captors that they could survive. If you look at the WWII and Korea prisoners, both groups were, for the most part, less educated individuals, many of whom may have had less will to survive. This is not to say that everyone in the Vietnam group survived. We know there were individuals who literally died because they had lost the will to live. The experience with the WWII and Korean war prisoners was that many began having problems between the seventh and ninth years after release. We are now in the seventh year with this group. It's going to be interesting to see whether we see the same thing occurring. I don't think we will see the same thing because of the differences in the groups I already mentioned. I hope I'm right.

Weren't the Vietnam POWs treated quite differently than their predecessors after they arrived home?

Very definitely. Plans were made to pick these people up with a view toward a long-term followup, something never done before. In August 1972, when it looked like the men were coming out, plans were made to pick them up in Hanoi.

What was actually done after the men were picked up?

One medical officer was assigned to several individuals right on the plane. When they got to Clark Air Force Base [The Philippines], they were given special privileges—calling home, special food, etc. They were made to feel that they were being welcomed home. And when they returned to the States, there was a welcoming ceremony every time one touched down someplace. That helped to ease the transition. They also knew they would be looked after medically over a period of time. After WWII and Korea, prisoners came back in large numbers. There was no particular fanfare. One must remember, in all fairness, that the WWII POWs arrived in great numbers. But with Korea, there was no reason why they could not have done the same thing we did. The Vietnam prisoners are the first group to be followed over a period of time.

What has the Navy learned about how to prepare future aviators for POW experience?

We teach a man what he can do for himself or his colleagues medically with very limited resources. He also learns how to resist.

How does the Navy POW program take the families into account? Certainly, they were as much victims as those in captivity.

The Navy had a very good program for the families while the men were prisoners. Presently, we try to help with family problems and even with the youngsters. What I am doing is looking after them in the local area. I act as their physician.

Generally speaking, how have the men readapted?

Most of the continuing problems are orthopedic with occasional captivity-related psychological problems. You have to understand my philosophy of medicine. I feel there is a great deal that can be done in the way of preventive rather than acute medicine. I would rather these men keep healthy than treat them after something has developed. I think we are accomplishing that. —JKH

A Survivor Teaches Survival

CDR Ralph E. Gaither, Jr., was shot down over North Vietnam on 17 Oct 1965 and spent the first 14 months after his capture in solitary confinement. After his release in 1973, he resumed his Navy career and earned a degree in sociology, a discipline he hoped would better enable him to teach what he himself experienced and survived. CDR Gaither is now Director of Survival Training, NAS Pensacola, FL. These are excerpts from a recent U.S. NAVY MEDICINE interview.

USNM: Your experiences as a POW obviously had a lot to do with the direction your career has gone since.
CDR Gaither: We were quite concerned that the lessons we learned in captivity would not have to be relearned by those who were captured in the future. We sought to pass on the information we had acquired. I was a young ensign when I was captured and came home nearly eight years later as a lieutenant commander with no other expertise other than being a survivor. I decided to devote the remaining part of my career to survival training.

What do you teach?

Survival training is divided into four phases. Phases I and II are taught here at Pensacola. Phase I is the post-accident phase. If you don't know how to swim, you're going to drown. You must know how to make a proper parachute landing in the water. Phase II is basic food, water, shelter, and navigation training—how to be a good Boy Scout. Phases III and IV deal with evasion and captivity.

After a person has gone through Phase IV, we take high-risk people and sit them at a round table with a Navy psychologist and returned POWs from Korea, South Vietnam, North Vietnam, people who have been prisoners in local or foreign jails—anyone we can get who has been a prisoner. These individuals

CDR Gaither

tell the trainees what it's like to be in captivity. There are many truths about captivity that are evident, whether you're a prisoner in Iran, Vietnam, or the Tijuana jail. First of all, you don't have your freedom; you are under the control of someone else. There are many common things about captivity that we pass on to these people.

What goes through one's mind when they are captured?

There's the shock phase. "Oh, God, I'm a prisoner!" This lasts about two or three days and then you go through a transition that lasts from three to six months. You then enter the long-term captivity phase in which you are forced to accept the fact that you're a prisoner and that you may be one for many years. You now have to stop reflecting on the past and living on memories. What you see is what you get. But human beings are very adaptable creatures and they will adapt to their situation.

The captive of the future is going to be involved in the same things we were involved in in Korea and North Vietnam. We're not concerned with captives revealing military secrets. They must be able to be wary of producing propaganda for the enemy and being an asset to him—making films or statements against this nation's interest. Future prisoners are going to confront the soft-sell approach in which the enemy attempts to win their confidence. I used to tell my students: "The best thing that can happen to you if you are captured is that the enemy walks up to you and slaps you in the face, because when he does, you will never forget it." I fear we haven't devoted enough time to teaching our students the soft-sell approach.

Did you get the soft-sell when you were captured?

In fact, they started to work me over a bit when an old man—a white-bearded Ho Chi Minh character—pushed everyone away and protected me. I identified this old man as my friend. One of the techniques we use in illustrating the hard-sell is the "Mutt and Jeff routine." One guy comes in and beats the hell out of you. And then another guy comes in and saves you. The one who does the saving is the one who will get the information he needs.

Do you see any parallels between your captivity and what the hostages in Iran may be experiencing.

I don't find their situation much different from the one we were in. They don't know when they're coming home. They are being held by a country we have no control over. North Vietnam was the same. There was no war declared in either case. I feel those people in Iran have the same things going for them that I had going for me—their own personal God and a country they believe will not forget them. I never thought America would forget me nor did I ever feel completely alone. With those two things going for you, it's pretty hard to lose. —JKH

Continuous Ambulatory Peritoneal Dialysis

CDR Richard D. Handy, MC, USNR

Despite the enactment of legislation by the Federal Government (PL 92603 of 1973), which currently finances the care of approximately 50,000 patients with end-stage renal disease (ESRD), delivery of this care has been essentially restricted to the purview of the fully-trained nephrologist with occasional and welcome assistance from vascular and transplantation surgeons. However, if present trends continue, this decade should see the care of the patient with ESRD emerge from the realm of esoterica to the commonplace and come within the abilities of the well-versed general internist, pediatrician, family practitioner, or adventuresome urologist. This trend represents a renaissance. Once again, there is the recognition that the peritoneal membrane capillaries can act as a substitute for the blood-filtering function of defunct glomerular capillaries. This rekindling of interest is a result of the demonstrated efficacy, simplicity, and reduced cost of continuous ambulatory peritoneal dialysis (CAPD).

Evolution

Dialysis refers to the passage of solutes through a semipermeable membrane interposed between two solutions. The rate and direction of solute transfer from one solution to the other depends on many factors: the composition of the solutions governing electrochemical and osmotic forces; the application of solutions to the membrane that modify important physical-chemical factors governing the availability of solutes to the membrane for transfer; and the membrane itself, exhibiting certain electrochemical and physical attributes that govern the passage or dialysance of the various solutes presented to it.

The use of dialysis as a laboratory tool for the removal of unwanted solutes from solutions was developed early in this century. Although Ganter(*1*) published work on the use of the peritoneal membrane as a dialyzing surface for the therapy of uremia in 1923, it was not until mid-century that this technique achieved wide clinical applicability. Development of peritoneal dialysis (PD) was retarded by significant difficulties in obtaining access to the peritoneal space and by a high infection rate.

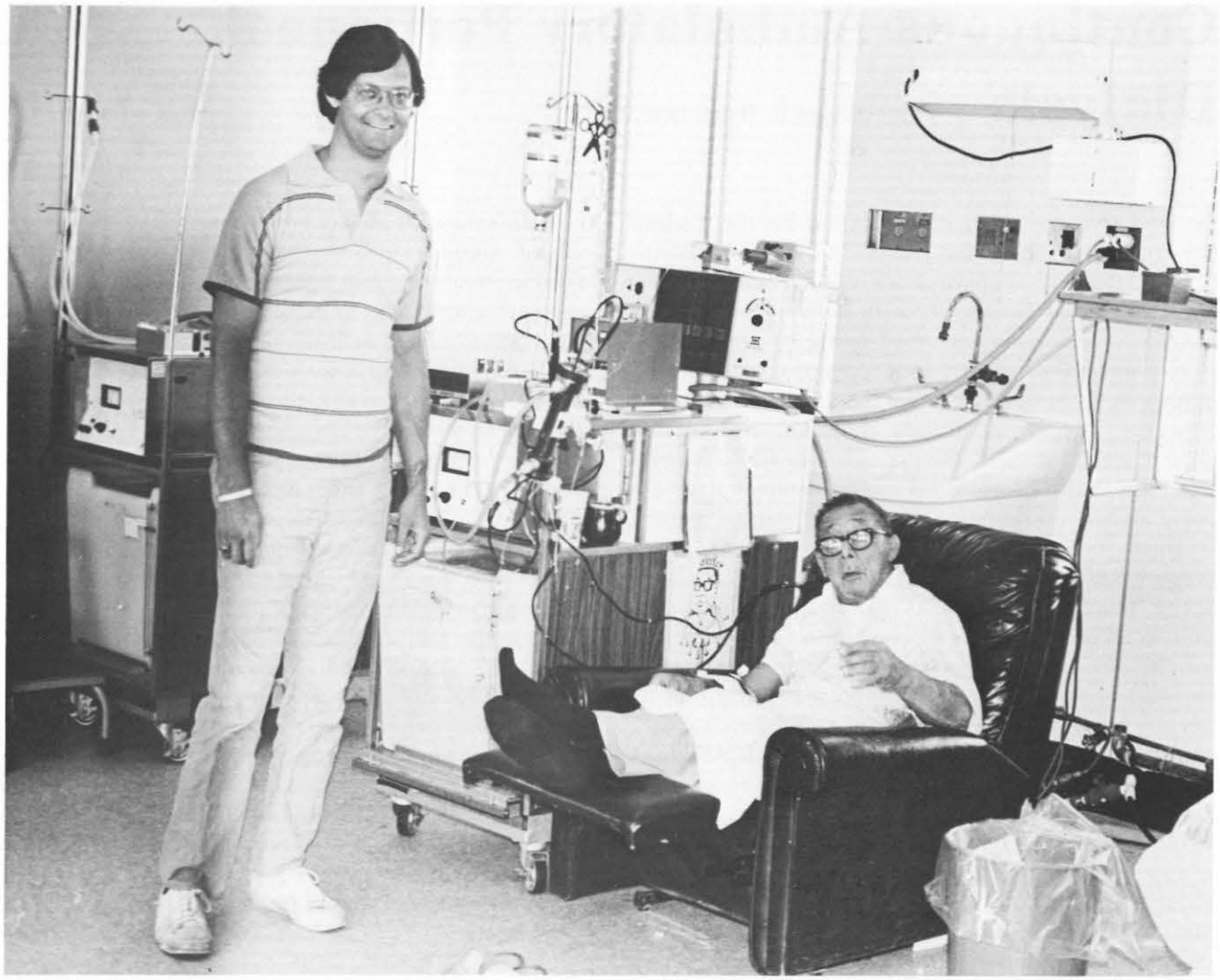
During World War II, Kolff(*2*) developed a reasonable alternative, i.e. extracorporeal circulation and dialysis of blood. Improving on animal studies by Abel and colleagues,(*3*) he wound a continuous tube of cellophane around a drum. The patient's blood was allowed to circulate through this pathway while the rotating drum allowed the tube to come in contact with a trough of solution of defined composition (dialysate). In 1960, a quantum leap in the development of hemodialysis (HD) was achieved with the introduction of a permanent access to the circulation by Quinton, Dillard, and Scribner.(*4*) With the further advent of federal financial support in the 1970s, there has occurred a virtual technology explosion in this field.

Advancements in the technology of peritoneal dialysis occurred simultaneously. With the introduction of commercial-available sterile dialysate,(*5*) simplified access to the peritoneum in 1959,(*6*) and an automatic cycling machine in 1964,(*7*) the problem of infection was significantly reduced. In 1967, Tenckhoff(*8*) resolved the major problem of repeated peritoneal punctures with the development of an implantable bacteriologically safe peritoneal dialysis catheter. The spectrum of dialytic therapy for end-stage renal disease in the mid 1970s, then, included machine-assisted hemo- or peritoneal dialysis performed for 5 to 13 hours, three times a week, in a hemodialysis center or in the home.

Innovation

The innovation of continuous ambulatory peritoneal dialysis was accomplished in Austin, TX, in the summer of 1975. Popovich had calculated that a slow rate of dialysis would be sufficient if applied continuously. When Moncrief and his other colleagues were faced with the care of an otherwise healthy young man with ESRD who could not undergo standard dialysis therapy, they applied the theory clinically.(*9*) Very simply, they taught this patient a technique of self-PD incorporating a number of exchanges of dialysate per week comparable to that of machine-assisted intermittent PD (IPD). But, instead of using a machine to cycle two liters of dialysate hourly into and out of the peritoneal space for 9 to 13 cycles, three times per week, this patient maintained two liters of dialysate in his abdomen *continuously* and manually exchanged it

CDR Handy is Head, Nephrology Branch and Director, Nephrology Fellowship Training Program, NRMC Portsmouth, VA 23708.



Photos by HMC Joseph D. Forsha

Each of these patients was undergoing dialytic therapy for end-stage renal disease when this picture was taken at NRMC Portsmouth, VA.

for fresh dialysate five times a day, seven days a week. The technique was remarkably successful and maintained the patient's well-being until renal transplantation five months later. Further and expanded research into this technique at the Austin Diagnostic Clinic and at the University of Missouri was then sponsored by the National Institutes of Health. On the basis of work at these centers and at Toronto Western Hospital, we now have available a body of experience and knowledge that confirms the simplicity and efficacy of this technique.

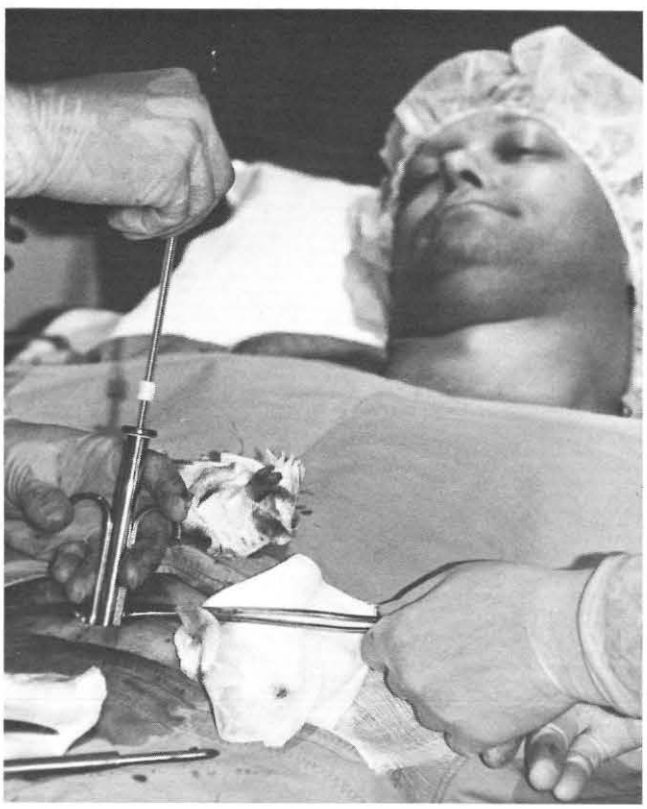
The Technique of CAPD

The technique of CAPD is not highly standardized at present. The following is a description of the technique utilized at NRMC Portsmouth, VA. It is a distillation of the published information from the relevant centers in Texas, Missouri, and Toronto; personal communication with Dr. Nolph of the University of Missouri; personal communication with and on-site instruction from Dr. Ramon at the Veterans Administration Hospital in Salem, VA; and our own experience.

The preoperative candidate for CAPD undergoes the usual presurgical evaluations such as chest x-ray, ECG, complete blood and platelet counts, serum chemistries (SMA6 and 12), blood clotting studies, and consultation with the surgeon. Consideration should be given at this time to baseline measurement of such parameters as serum parathyroid hormone, cholesterol and triglyceride concentrations, and nerve conduction velocity if these have not already been done. Particular attention

must be paid to adequacy of bowel function, as constipation is one of the most frequent causes of catheter malfunction.

On the morning of surgery, normal saline is slowly administered intravenously to provide an immediate route for administration of atropine sulfate in the event of a vasovagal episode during surgery, the bladder is emptied by means of a foley catheter which remains in place until the conclusion of the procedure, and urine is cultured. The patient is then transferred to a quiet room in our intensive care unit. Surgical expertise is provided by a single staff general surgeon who has demonstrated enthusiasm and expertise in this procedure. A double-cuff Tenckhoff peritoneal dialysis catheter is then surgically implanted, utilizing a specially designed trocar and with full sterile technique. (*10*) The first cuff of the catheter is sutured in place just outside of the parietal peritoneum. The catheter then progresses outward through a curved subcutaneous tunnel to an exit site through the skin. The second cuff is sutured in place just under the skin. The cuffs and the fibrous tunnel provide an excellent defense against the introduction of infection along the tract of the catheter. A permanent connector made of titanium with a Luer-Lock configuration is placed at the proximal end of the catheter to provide a watertight and strong connection to the dialysate administration tubing.



Sterile and expert implantation of the Tenckhoff Catheter using a specialized trocar is a critical step in the initiation of CAPD.

There follows a period of rapid, small-volume (500 cc) peritoneal lavage with heparinized dialysate until the drainage is cleared of blood products introduced by the surgical procedure. This is continued on an hourly-cycle basis to a total of 24 hours with a gradual increase in the volume of dialysate instilled to 1,000-1,500 cc per exchange. All this is designed to insure patency of the catheter by removing thrombogenic material from the abdomen. Periodic samples of the drainage fluid are sent for gram stain, cell count and differential, and for bacterial and fungal cultures.

At the conclusion of the initial 24-hour period, the abdomen is drained, the patient is transferred to the ward, and no further exchanges are performed for a period of two to four days. This "rest" period is designed to allow for sealing of the peritoneal entry (and exit) site to avoid leaks around the catheter or subcutaneous accumulation of dialysate along the catheter tract. Catheter patency is maintained during this period by bolus-infusion of 50-150 cc of heparinized dialysate from a single bag every three or four hours. The abdomen is again drained and the fluid sent for bacteriologic studies every 24 hours. In addition, well-being is monitored periodically by vital signs, complete blood count, and serum electrolytes.

The patient then begins learning the manual technique for dialysate bag changes. This learning period may last two to four days and includes instruction and observation in manual technique and education regarding procedures for contingencies, e.g. signs of peritonitis, contamination of tubing spike, etc. With the above accomplished, the patient is discharged to home on a prescribed program of CAPD. Typically, this consists of four exchanges per day, e.g. 0700, 1200, 1700, 2200, of two liters per exchange. At these times, the patient sits down and allows the dialysate in his abdomen to drain into the bag. He then carefully and with a modified sterile technique removes the tubing spike from the old bag and inserts it into a new bag of dialysate. The new dialysate is then infused after which the administration line is clamped and the empty bag—still connected—is rolled up and either wrapped around the waist or put in a pocket. This same bag is then used for collection of drainage at the next exchange. Adequate ultrafiltration of plasma water is usually achieved with three daytime exchanges utilizing dialysate with 1.5 percent dextrose and one nighttime exchange of dialysate with 4.25 percent dextrose. The patient monitors body weight and blood pressure daily and modifies the number of exchanges of hyper-

tonic (4.25 percent dextrose) dialysate accordingly. The total daily number of exchanges may be increased or decreased according to the steady-state serum creatinine level. (*11*) The dialysate administration tubing which connects the Tenckhoff catheter via the titanium adapter to the dialysate bag is changed monthly by a nurse at the dialysis center.

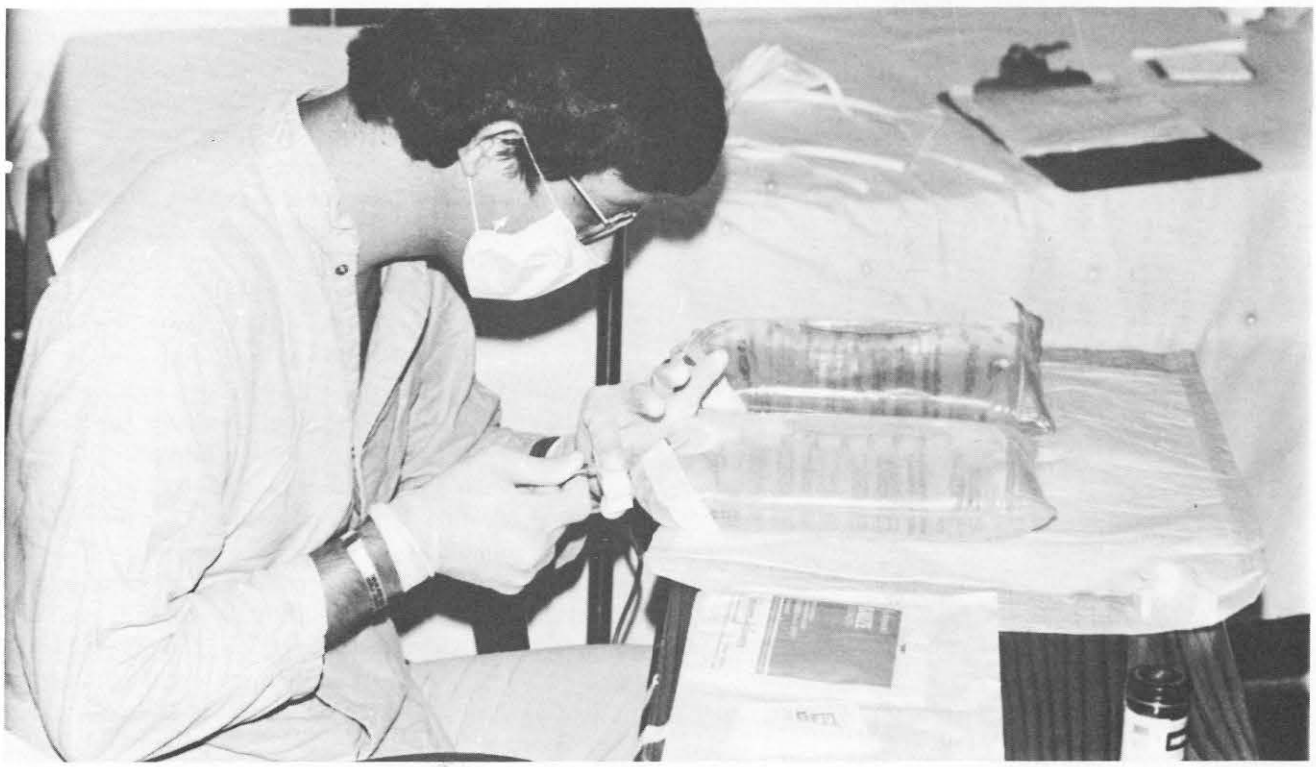
Results

Acceptable control of serum creatinine, BUN (blood urea nitrogen), hematocrit, weight, total body potassium, calcium, phosphorus, total protein, albumin, and nerve conduction velocity have been achieved. (*12*) In fact, hemoglobin concentration, strength, and muscle mass increase while serum urea nitrogen values have been lower than expected on a high protein diet, suggesting that the patients become anabolic. (*13*) This may relate to the differential efficiency of CAPD. CAPD is only two-thirds as efficient as HD in the removal of small molecular weight solutes (urea) but is six times as efficient as HD in the removal of higher molecular weight solutes (inulin, MW 5200). (*14*) It has long been proposed that much of the residual morbidity associated with HD may relate to its low efficiency in removal of retained solutes ("uremic toxins") in the range of 3,500-5,000 Daltons.

Significant dietary restriction is not required with CAPD. No restriction of potassium or protein intake is prescribed. In fact, protein intake of one to one and a half grams per kilogram body weight per day is encouraged to offset protein losses through the peritoneal membrane of 10-20 grams per day. The need for phosphate binders is lessened if not abolished as is the need for antihypertensive medication. Replacement therapy with water-soluble vitamins is continued.

Morbidity

The major and continuing cause of morbidity with CAPD is the occurrence of peritonitis. Before October 1978, dialysate was not available in the United States in plastic bags as it was in Canada. Thus, while the groups in the U.S., who had to use glass-bottled dialysate, were experiencing one episode of peritonitis every 14 patient-weeks, (*14*) the group in Toronto was experiencing this complication at a rate of one episode per 10.5 patient-months. (*15*) With the further advent of an inert titanium connector and refinements in bag-changing techniques, the group in Missouri is now (June 1980) enjoying an infection rate of one episode per five patient-years! (*16*) The occurrence of peritonitis is usually associated with any or all of the following: abdominal pain, cloudy drainage, fever, and difficulty



Rigorous adherence to the bag-changing protocol virtually eliminate the occurrence of peritonitis.

draining dialysate completely. It is almost always associated with a dialysate white blood cell-count above 300 per mm3, mostly neutrophils. The vast majority of infecting agents are common aerobic bacteria: Staph., Strep., Enterobacter, Pseudomonas, and Acinetobacter. Many patients respond to a two-week course of intraperitoneal antibiotics. Some will require hospitalization for one to three days of rapid cycling (i.e. peritoneal lavage) with intraperitoneal and systemic antibiotics. The emergence of fungal peritonitis often requires replacement of the catheter. (*17*)

Other causes of catheter malfunction are usually mechanical and usually resolve with the use of laxatives and/or manipulation of the Tenckhoff catheter with a Fogarty catheter. Catheter entrapment by bowel or mesentery may be reduced through utilization of the Toronto Wester catheter, which incorporates two silastic discs at the distal end. (*16*)

There is considerable absorption of glucose from the dialysate: 22 grams per six-hour exchange with 1.5 percent dextrose dialysate and 52 grams per six-hour exchange with 4.25 percent dextrose dialysate. This has been associated with a moderate to marked increase in serum triglyceride concentration in some patients. (*12*) The long-term effect of this is unknown.

There appears to be no significant loss of dialysis efficiency or efficacy over time (three years so far) even in patients who have suffered repeated episodes of peritonitis. (*12, 19*)

There is a notable lack of side effects with CAPD. The occurrence of episodes of disequilibrium so typical of the patient on HD are absent with CAPD. Because CAPD is a continuous therapy, cardiovascular stress does not occur three times per week. An occasional patient may develop orthostatic hypotension or muscle cramps but both these complications resolve with adjustment of dialysate (less 4.25 percent and more 1.5 percent). In Canada, the recent introduction of dialysate with 2.5 percent dextrose has done much to eliminate this complication. (*11*)

Patient Selection

Almost any patient with ESRD who is sighted, sane, has a willingness to follow simple directions rigorously, and has a minimum of manual dexterity is a candidate for CAPD. Exceptions include patients with disease of the lower spine (where the additional introabdominal contents may exacerbate their pain) and those with various kinds of ostomies which open to the abdominal surface and would invite the development of peritonitis. Excellent results have been obtained with the use of CAPD in diabetics (with intraperitoneal administration of insulin) and in children. (*11*)

A New Era

The major immediate benefits to be gained from CAPD are three: freedom from machinery; low cost (CAPD is roughly one-third the cost of HD); and enhanced patient rehabilitation. It does not preclude other forms of therapy. Indeed, our first CAPD patient received a renal transplant after three months of very successful CAPD. At present, there are probably close to 1,000 patients receiving CAPD in the U.S. and several thousand worldwide. (*12*) As with HD, the cost of this therapy is reimbursable through medicare channels.

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